

**FINAL
SITE MANAGEMENT WORK PLAN
118-130 SWALM STREET
SITE # 1-30-043P**

WORK ASSIGNMENT NO. D004444-20

Prepared for:

**New York State Department of Environmental Conservation
Albany, New York**

Prepared by:

**MACTEC Engineering and Consulting, P.C.
Portland, Maine**

MACTEC: 3612072097

JUNE 2008

This document was prepared for the sole use of the New York State Department of Environmental Conservation, the only intended beneficiary of our work. No other party shall rely on the information contained herein without prior written consent of MACTEC Engineering and Consulting, P.C.

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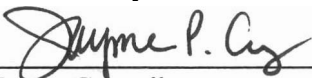
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Submitted by:


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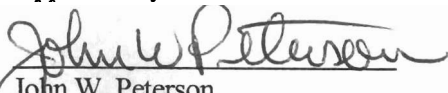

John W. Peterson
Principal Professional

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GLOSSARY OF ACRONYMS AND ABBREVIATIONS

ASP	Analytical Services Protocols
bgs	below ground surface
°F	degrees Fahrenheit
HASP	Health and Safety Plan
HSA	hollow stem auger
LMS	Lawler, Matusky and Skelly Engineers
MACTEC	MACTEC Engineering and Consulting, P.C.
msl	mean sea level
NCIA	New Cassel Industrial Area
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
OM&M	Operations, Maintenance and Monitoring
PID	photoionization detector
ppb	parts per billion
QAPjP	Quality Assurance Project Plan
QAPP	Quality Assurance Program Plan
ROD	Record of Decision
Site	118-130 Swalm Street site
SMWP	Site Management Work Plan
UGA	Upper Glacial Aquifer
VOC	volatile organic compound
WA	work assignment

1.0 INTRODUCTION

This Site Management Work Plan (SMWP) has been prepared by MACTEC Engineering and Consulting, P.C. (MACTEC) in response to Work Assignment (WA) No. D004444-20 from the New York State Department of Environmental Conservation (NYSDEC) for the 118-130 Swalm Street site (Site), in North Hempstead, New York (see Figure 1.1). The Site is listed as a Class 2 Inactive hazardous waste site, Site No. 1-30-043P, in the Registry of Hazardous Waste Sites in New York State (NYS).

WA No. D004444-20 was issued to MACTEC on October 22, 2007 (NYSDEC, 2007a) in response to the Site's Record of Decision (ROD) (NYSDEC, 2004). The selected remedy for the 118-130 Swalm Street site is "No Action with continued groundwater and soil vapor monitoring". This SMWP was prepared in accordance with the Site's Project Management Work Plan (MACTEC, 2008) and includes details regarding the design and implementation of the selected remedy, including a Site-specific Health and Safety Plan (HASP) and a Quality Assurance Project Plan (QAPjP).

This SMWP is organized into four sections as follows:

- Section 1.0 – Introduction;
- Section 2.0 – Site Background and Physical Setting;
- Section 3.0 – Scope of Work; and
- Section 4.0 – References.

2.0 SITE BACKGROUND AND PHYSICAL SETTING

Information presented below has been summarized using historical documents for this Site (NYSDEC, 1998; NYSDEC, 2000; NYSDEC, 2004; and NYSDEC, 2007b).

2.1 SITE LOCATION

The Site is located at 118-130 Swalm Street within the New Cassel Industrial Area (NCIA) in North Hempstead, Nassau County, NY. The property is approximately 1.1 acres and has a chain-linked fence around the northern perimeter. The Site is developed with one single story steel and masonry building with an approximate 28,000 square feet footprint. A former parking lot occupies the northern portion of the Site, which consists of asphalt, weeds and exposed soil. The Site is bounded on the north (Long Island Railroad, Railroad Avenue), east (Rushmore Street), west (Swalm Street) and south by another commercial property.

The NCIA is located in a highly developed area in the Town of North Hempstead, NY. The NCIA is approximately 170 acres in size and is bounded by the Long Island Railroad (north), Frost Street (east), Old Country Road (south) and Grand Boulevard (southwest) (Figure 1.1). As of March 2004, there were eleven Class 2 classified sites within the NCIA.

2.2 SITE HISTORY

The Site was first developed in 1961 with the current single story building and was occupied by a mechanical engraving company and a plastic extrusion company. Historical occupants at the Site have consisted of:

- 1971 to 1974 – All Records Distributor
- 1979 to 1992 – Allomatic Industries and Louis Jordan Labs
- 1985 – Atlas Graphics
- 1994 to unknown – Liqui-Mark Corporation
- Currently vacant

2.3 PREVIOUS INVESTIGATIONS

In 1986, an investigation was conducted of the groundwater quality and it was determined that the NCIA was a major source of volatile organic compound (VOC) contamination in groundwater. Subsequently in 1988, the NYSDEC classified the entire NCIA as a Class 2 site.

Initial investigations in the NCIA conducted in 1993 and 1994 by Lawler, Matusky and Skelly Engineers (LMS) identified several areas that exhibited significant groundwater contamination (NYSDEC, 2000). In 1995 LMS conducted a multi-site preliminary site assessment in the NCIA to further delineate the contaminant plumes, locate the sources of the contaminants and assess the threat of each source to the environment. Based on this report, the NYSDEC removed the NCIA from the Class 2 site list and added five individual Class 2 sites, not including the 118-130 Swalm Street site.

In 1995, two downgradient groundwater samples were collected from 118-130 Swalm Street; both showed concentrations of tetrachloroethene at 1,600 parts per billion (ppb) and 1,800 ppb. The data generated from this investigation was used by the NYSDEC to list the Site on the Registry as a Class 2 site in May of 1997.

A Remedial Investigation was conducted on the Site property between December 1998 and November 2002. VOC contamination was observed in groundwater samples collected at the Site. Based on these results, a ROD was issued in March 2004 (NYSDEC, 2004) selecting a “No Action with continued groundwater and soil vapor monitoring” remedy.

2.4 PHYSICAL SETTING

The sections below describe the Site topography, climate, surface water and groundwater hydrology, and geology.

2.4.1 Topography

The Site is situated within the Town of North Hempstead, Nassau County, New York and is approximately 120 feet above mean sea level (msl) (see Figure 1.1). The Site is approximately six miles south east of Hempstead Harbor on Long Island Sound and nine miles north of Middle Bay and

the Atlantic Ocean. The topography in the immediate vicinity of the Site is characterized by a relatively flat grade (NYSDEC, 2004).

2.4.2 Climate

The climate of the area is characterized by moderately warm summers and cold winters. Mean monthly temperatures range from 32 degrees Fahrenheit (°F) in January to 74°F in July. Average semi-annually precipitation is 46 inches (National Climatic Data Center, 1999).

2.4.3 Surface Water Hydrology

The closest down gradient surface water body to the relatively flat topography of the Site is Meadow Brook, situated approximately 2.75 miles southwest of the Site. Due to diversion of local stormwater to Nassau County catch basins in the vicinity of the Site, runoff from the Site to Meadow Brook is not likely.

2.4.4 Groundwater Hydrology

Previous investigations conducted at the Swalm Street Site indicated that groundwater is estimated to be approximately 55 feet below ground surface (bgs) and is interpreted to flow to the southwest (NYSDEC, 2004).

2.4.5 Geology

The Site is generally covered with buildings or paved. Beneath the site, two aquifers exist: the Upper Glacial Aquifer (UGA), which consists of Upper Pleistocene deposits of poorly sorted sand and gravel to approximately 80 feet bgs, and beneath the UGA, the Magothy Formation, which consists of fine sand and clayey sand and some black, grey white, red clay. Gravelly zones are common to the bottom of the Magothy Formation, or at approximately 550 feet msl. Underlying the aquifers is the bedrock surface at a depth of approximately 1,000 feet bgs of Cenozoic era, quaternary system, Pleistocene series (NYSDEC, 2004; FP&M, 1998).

3.0 SCOPE OF WORK

This SMWP has been developed to satisfy the requirements of the Site's ROD (NYSDEC, 2004) and address the selected remedy. The components of the selected remedy include:

- **Monitoring Well Installation** - Three groundwater monitoring wells will be installed, one upgradient and two downgradient from the Site. The wells will be installed to a depth of approximately 65 feet bgs, using hollow stem auger (HSA) drilling techniques, and screened at the water table.
- **Groundwater Sampling** - Semiannual sampling will be conducted for a minimum of two years, with sampling events occurring during high (spring) and low (fall) water conditions.
- **Soil Vapor Monitoring** - Six soil vapor samples will be collected using direct push techniques around the perimeter of the property, with a focus on assessing downgradient conditions. Three direct push soil vapor locations will be sampled at two discrete depth intervals, approximately 8 feet bgs and immediately above the water table (approximately 50 feet bgs).

Figure 3.1 is an aerial photograph of the Site area and illustrates the proposed exploration locations. A summary of the field tasks and methodologies, as well as the sample ids and analytical program is provided in Tables 3.1 and 3.2.

3.1 OPERATIONS, MAINTENANCE AND MONITORING (OM&M) IMPLEMENTATION PLAN

Companion documents to this SMWP that will govern the conduct of the Operations, Maintenance and Monitoring (OM&M) implementation include MACTEC's Program Quality Assurance Program Plan (QAPP) (MACTEC, 2007) and HASP (MACTEC, 2005), stand-alone documents provided in Appendices A and B, respectively. In addition to these program documents, Appendix A contains Site-specific details related to quality assurance and quality control as set forth in the QAPjP and Appendix B provides details related to health and safety for on-Site activities as presented in the Short Form HASP.

Subcontractors chosen to support the OM&M implementation include:

- **Columbia Analytical Services** – Analytical Services Protocols (ASP) laboratory services to support groundwater analyses;
- **Centek Labs** – ASP laboratory services to support soil vapor monitoring; and

- GeoLogic NY, Inc. – drilling services to support installation of groundwater monitoring wells and direct push services for collecting soil vapor monitoring samples.

3.1.1 Mobilization

Upon approval of this SMWP, MACTEC will begin mobilization efforts. Mobilization will include obtaining utility clearances for all proposed locations, procurement of subcontractors, and coordination of supplies. The NYSDEC will be responsible for obtaining Site access.

Prior to the commencement of any field activities, a kick-off meeting will be held on-Site with MACTEC and subcontractor personnel to familiarize on-Site workers with the Site's history, health and safety requirements, sampling procedures, decontamination efforts, and investigation derived waste handling.

3.1.2 Groundwater Monitoring Well Installation

To evaluate the presence of VOCs at the water table, three 2-inch overburden monitoring wells (MW-1, MW-2 and MW-3) will be installed (Figure 3.1). The exact locations of the wells may vary based on property access and/or utility clearance.

Each overburden monitoring well boring will be advanced using HSA drilling techniques to the top of the water table. Soil samples will be characterized in 10 foot intervals using 2-foot split spoons. For each 10 foot interval, photoionization detector (PID) headspace readings, sample description and classification using the Unified Soil Classification System, and drilling observations will be recorded on field data records (QAPP Figures 4-4, 4-6, and 4-7; MACTEC, 2007) and as discussed in Subsection 4.5.2.2 of the QAPP (no analytical soil samples will be collected).

The overburden monitoring wells will be constructed of 2-inch inside diameter schedule 40 polyvinyl chloride with ten foot well screens and threaded flush joint risers in accordance with Subsection 4.4.4 of the QAPP (MACTEC, 2007). Monitoring wells will be installed with ten-foot screens set just below the water table. Well screens will have 0.010-inch wide machine slots (unless geologic conditions dictate otherwise) with # 0 sand pack to 2 feet above the screen, a two foot bentonite seal above the sand pack and a bentonite grout backfill to the ground surface. The wells will be completed with a locking cap and a six-inch flush mount steel cover.

3.1.3 Groundwater Monitoring Well Development

Upon completion of monitoring well installations, the newly installed monitoring wells will be developed (no sooner than 24 hours after installation for wells installed with top of screens below the water table) using pump and surge techniques as described in the Section 4.4.4 of the QAPP (MACTEC, 2007). Well depths will be measured to determine if excessive silt has built up at the bottom of the well. If it is determined that there is silt at the bottom, wells will be developed with pump and surge techniques to remove excess sediment. If little to no sediment is present, wells may still be pumped (i.e. with whale pump) to qualitatively evaluate well conductivity/recharge and remove stagnant water. Well development activities will be documented on a Well Development Record (QAPP Figure 4-9; MACTEC, 2007)

3.1.4 Groundwater Sampling

After monitoring wells have been installed and developed, periodic groundwater sampling will be conducted for VOCs. Table 3.2 summarizes the sample ids and analytical program.

The initial sampling event will be no sooner than two weeks following the development of the monitoring wells. Prior to sampling, a synoptic round of water levels will be measured. Monitoring wells will then be sampled using low-flow sampling procedures as described in the Section 4.5.4.3.2 of the QAPP (MACTEC, 2007). Samples will be collected from upgradient to downgradient locations based on the interpreted groundwater flow direction and historic analytical data. Field measurements for pH, temperature, specific conductivity, oxidation reduction potential, dissolved oxygen, and turbidity will be collected through a flow through cell (with the exception of turbidity) from each well during pre-sample purging.

Semiannual (spring and fall) sampling will be conducted for a minimum of two years (four sampling events). Monitoring well sampling activities will be documented using a Low Flow Groundwater Data Record (QAPP Figure 4-16; MACTEC, 2007).

3.1.5 Soil Vapor Sampling

A one-time soil vapor monitoring event will be performed. A total of six soil vapor samples will be collected around the outside of the building to evaluate whether residual contamination exists. Soil vapor samples will be collected from each location at two discrete depth intervals (immediately above the water table [approximately 50 feet bgs] and 8 feet bgs) (see Figure 3.1). The exact locations of the soil vapor points may vary based on property access and/or utility clearance.

Soil vapor samples will be collected using direct push technology as described in the Section 4.5.1.3 of the QAPP (MACTEC, 2007). The Geoprobe® rods will be pushed to approximately 50 feet bgs, which is anticipated to be immediately above the water table. Soil vapor collected just above the water table will give an indication of the possible vapor migration from potentially contaminated groundwater. Upon termination of the collection of the soil vapor sample from approximately 50 feet bgs, the geoprobe rods will be pulled back to approximately 8 feet bgs. Samples collected from a depth interval of 8 feet bgs will help to evaluate the potential for soil vapor intrusion to on-Site structure.

Soil vapor samples will be collected using the Geoprobe® PRT system using SUMMA canisters (QAPP Section 4.5.1.3; MACTEC, 2007). Approximately 1 liter of soil vapor, plus the volume of the tubing, will be purged using a personal air monitoring pump before collecting samples. During the soil vapor purge, vapors will be screened with a PID. A helium leak test will be conducted on a subset of the soil vapor samples collected to assess proper sampling technique and representative samples are being collected. Helium tests will be conducted in accordance with the QAPP (Section 4.5.1.3).

Local conditions that may influence interpretation of the results will be documented during sampling:

- The identification of commercial or industrial buildings that may use volatile chemicals during normal operations of the facility;
- Outdoor plot sketches will be drawn as needed that include the Site, area streets, neighboring commercial or industrial facilities (with estimated distance to the Site), outdoor ambient air sample locations (if applicable), and compass orientation (north arrow);
- Local weather conditions (e.g., precipitation, outdoor temperature, barometric pressure, wind speed and direction) should be noted for the past 24 to 48 hours; and
- Pertinent observations, such as odors and readings from field instrumentation.

Soil vapor sampling activities will be documented using a Soil Vapor Sampling Record (QAPP Figure 4-11, MACTEC, 2007). Table 3.2 summarizes the sample ids and analytical program.

3.2 SITE SURVEY

A survey will be performed for the three newly installed wells (no formal survey of the Site and surrounding area is scoped). Horizontal locations will be tied to the NYS Plane Coordinate System using North American Datum of 1983, and measured to an accuracy of 0.1 foot. Vertical elevations of groundwater monitoring wells will be tied to msl, using National Geodetic Vertical Datum of 1988, and measured to an accuracy of 0.01 foot. Locations of the three soil vapor direct push locations will be surveyed using a Trimble Global Positioning Satellite.

3.3 INSTITUTIONAL ENGINEERING CONTROLS

Information presented in the ROD (NYSDEC, 2004) indicates the Site does not present a threat to public health or the environment; therefore no institutional or engineering controls are warranted at this time.

3.4 OM&M REPORTING

Upon completion of the OM&M implementation components and receipt of validated analytical data from the initial groundwater sampling and soil vapor monitoring events, MACTEC will prepare an interim OM&M Report. The interim OM&M Report will summarize activities performed and results obtained from the groundwater and soil vapor monitoring events. Field data records and validated laboratory results will be included as appendices to the interim OM&M Report.

Groundwater analytical results will be compared to the NYS Class GA Groundwater Quality Standards, 6 New York Codes, Rules, and Regulations Part 703, (NYS, 1999). Reported concentrations of individual analytes indicating a contravention of standards or guidelines will be noted in the report.

Two additional interim OM&M Reports will be prepared summarizing the semiannual groundwater monitoring events. Upon completion of the last (fourth) groundwater monitoring event, a final OM&M Report will be prepared and submitted to summarize activities conducted at the Swalm Street

Site as part of this WA. The information provided in the OM&M Reports will aid the NYSDEC in reclassifying the Site, if appropriate.

All OM&M Reports submitted to the NYSDEC will be in portable document format and emailed to the NYSDEC project manager. At the completion of the WA, one paper copy of each interim OM&M Reports will be submitted along with a CD containing all consolidated reports from each period.

4.0 REFERENCES

Fanning, Phillips and Molnar (FP&M), 1998. Focused Remedial Investigation Work Plan for 118-130 Swalm Street, New Cassel, NY. October 1998.

MACTEC Engineering and Consulting, P.C., 2005. Program Health and Safety Plan. Prepared for New York State Department of Environmental Conservation, Albany, New York. 2005.

MACTEC Engineering and Consulting, P.C., 2007. Program Quality Assurance Program Plan. Prepared for the New York State Department of Environmental Conservation, Albany, New York. October 2007

MACTEC Engineering and Consulting, P.C., 2008. "Draft Site Management Project Management Work Plan - 118-130 Swalm Street". Prepared for New York State Department of Environmental Conservation, Albany, New York. January 24, 2008.

National Climactic Data Center (NCDC), 1999. Comparative Climactic Data for the United States through 1998. June 22, 1999.

New York State (NYS), 1999. New York Codes, Rules, and Regulations, Title 6, Part 700-705 Water Quality Regulations Surface Water and Groundwater Classifications and Standards. Amended August 1999.

New York State Department of Environmental Conservation (NYSDEC), 1998. Focused Remedial Investigation Work Plan for 118-130 Swalm Street Avenue, New Cassel, New York. Prepared by Fanning, Phillips & Molnar. October, 1998.

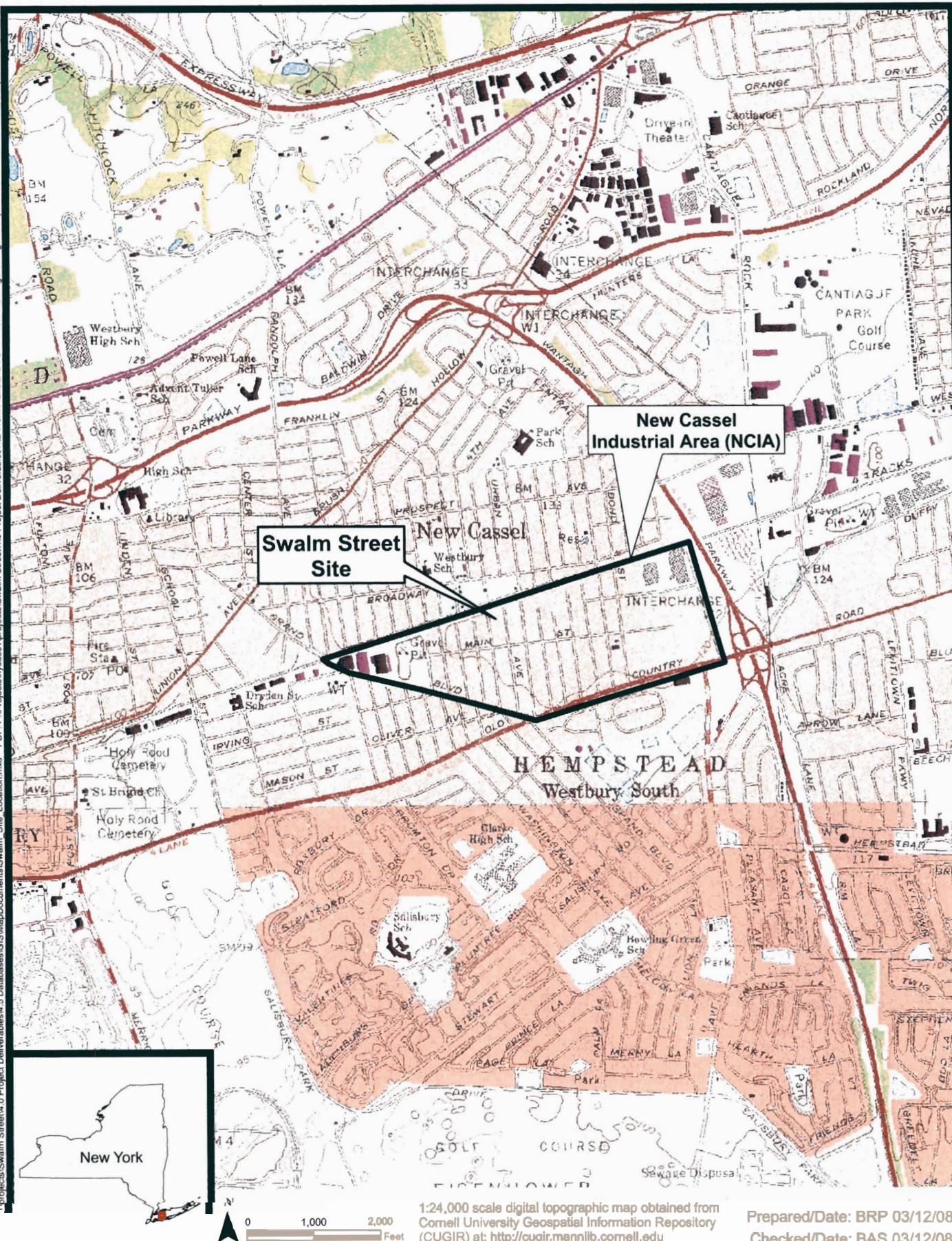
New York State Department of Environmental Conservation (NYSDEC), 2000. Supplemental Focused Remedial Investigation Report for 118-130 Swalm Street, Westbury, New York. Prepared by Fanning, Phillips & Molnar. May, 2000.

New York State Department of Environmental Conservation (NYSDEC), 2004. Division of Remediation. Record of Decision, 118-130 Swalm Street Site, Town of North Hempstead, Nassau County, New York; Site Number 1-30-043P. March 2004.

New York State Department of Environmental Conservation (NYSDEC), 2007a. Work Assignment #D004444-20, 118-130 Swalm Street, Site #1-30-043P - letter dated October 22, 2007.

New York State Department of Environmental Conservation (NYSDEC), 2007b. Standby Contract Work Assignment, 118-130 Swalm Street, Site #1-30-043P – memorandum with Summary of Site Information, Work Assignment Scope of Work, Estimated Budget, Period of Performance, Cost authorization, and Project Schedule October 22, 2007.

FIGURES



1:24,000 scale digital topographic map obtained from Cornell University Geospatial Information Repository (CUGIR) at: <http://cugir.mannlib.cornell.edu>

Prepared/Date: BRP 03/12/08
Checked/Date: BAS 03/12/08

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SITE MANAGEMENT WORK PLAN
118-130 SWALM STREET SITE
NORTH HEMPSTEAD, NEW YORK



PROPOSED EXPLORATION LOCATIONS
Project 3612-07-2097
Figure 3.1

Prepared/Date: BRP 03/12/08
Checked/Date: BAS 03/12/08

Site Management Work Plan – 118-130 Swalm Street
NYSDEC – Site No. 1-30-043P
MACTEC Engineering and Consulting, P.C., Project No. 3612072097

June 2008
Final

TABLES

Table 3.1: Field Tasks and Methodology

LOCATION ID	DESCRIPTION AND METHODOLOGY	RATIONALE	ANALYTICAL
DP-1 through DP-6	Advance three (3) direct push borings down-gradient from the Site building. Collect six (6) soil vapor samples (2 samples from each boring) from approximate depths of 8 feet and 50 feet below ground surface.	Characterize soil vapor conditions at the Site; evaluate potential for residual VOCs in Site soil.	TCL VOCs using USEPA Method TO-15.
MW-1, MW-2 and MW-3	Install three monitoring wells at the Site (one upgradient and two downgradient). Collect semiannual groundwater samples from newly installed wells using low flow sample techniques.	Evaluate groundwater conditions upgradient and downgradient of the Site.	TLC VOCs using USEPA Method 8260B.

Prepared/Date: BAS 03/10/2008

Checked/Date: JPC 03/18/2008

Notes:

TCL VOCs = Target Compound List Volatile Organic Compounds

Table 3.2: Proposed Sample Identification and Analyses

						Water Samples	Soil Vapor Samples
Site Type	Media	Site ID	Sample ID	MS/MSD	DUP	VOCs (8260)	VOCs (TO-15)
Groundwater Monitoring Well Sampling							
Monitoring Well	Groundwater	MW-1	130043P-MW1-GW__	1		1	
Monitoring Well	Groundwater	MW-2	130043P-MW2-GW__			1	
Monitoring Well	Groundwater	MW-3	130043P-MW3-GW__		1	1	
Geoprobe Soil Vapor Sampling							
Soil Vapor	Air	DP-01	130043P-DP1-SV__				1
Soil Vapor	Air	DP-02	130043P-DP2-SV__		1		1
Soil Vapor	Air	DP-03	130043P-DP3-SV__				1
Soil Vapor	Air	DP-04	130043P-DP4-SV__				1
Soil Vapor	Air	DP-05	130043P-DP5-SV__				1
Soil Vapor	Air	DP-06	130043P-DP6-SV__				1
TOTAL SAMPLES				1	2	3	6

Notes:

Sample ID = 14-digit sample identification as outlined in the QAPP. The 13 and 14 digit locations represent the sample depth below ground surface (__ = determined in field)
 MS/MSD = matrix spike and matrix spike duplicate sample
 DUP = duplicate sample
 VOCs Target Compound List Volatile Organic Compounds
 Field QC blanks collected per QAPP (Section 9.0)

Prepared by: BAS
 Checked by: JPC

*Site Management Work Plan – 118-130 Swalm Street
NYSDEC – Site No. 1-30-043P
MACTEC Engineering and Consulting, P.C., Project No. 3612072097*

*June 2008
Final*

APPENDIX A

QUALITY ASSURANCE PROJECT PLAN (QAPjP) and QUALITY ASSURANCE PROGRAM PLAN (QAPP) (on CD-ROM)

APPENDIX A
QUALITY ASSURANCE PROJECT PLAN
118-130 SWALM STREET SITE

This Quality Assurance Project Plan (QAPjP) identifies sections of the QAPP (MACTEC, 2007) that apply to the activities described in the Site Management Work Plan, describes variances to those procedures, and specifies the analytical methods used for laboratory analysis of environmental samples.

General Procedures. The general procedures used to conduct the OM&M at the Swalm Street site will be taken from the following sections of the QAPP:

Section 2.0	Program Organization and Responsibilities
Section 9.0	Internal Quality Control
Section 11.0	Preventive Maintenance
Section 12.0	Data Assessment
Section 13.0	Corrective Action
Section 14.0	Reports to Management

Sampling Procedures. The following sampling techniques and procedures set forth in the QAPP will be used at the site:

QA/QC Procedures	Section 3.0
Decontamination	Subsection 4.3
Sample Handling	Subsections 4.5 and 5.0
Exploratory Drilling	Subsection 4.4.3
Low Flow Groundwater Sampling	Subsection 4.5.4.3
General Soil Vapor Sampling Methodology	Subsection 4.5.1.3
Global Positioning Surveys	Subsection 4.8.2
Field Instrument Calibration	Section 6.0

Variances. The variances to the QAPP procedures are listed below.

IDW procedures for disposal of purge water - well water purged prior to groundwater sampling will be considered contaminated and placed in USDOT-approved 55-gallon containers if visual and olfactory signs of contamination are noted. If no visual and olfactory signs of contamination are noted, water will be considered non-hazardous and will be allowed to infiltrate into the ground surface at the sampling location.

- IDW procedures for disposal of drill soil cuttings – soil cuttings will be screened for VOCs with a PID. Soils with visual evidence of contamination or with PID readings greater than 5 ppm will be containerized in USDOT approved 55-gallon containers for off-site disposal. Soils with sustained PID readings of less than or equal to 5 ppm will be considered non-contaminated and will be used as backfill for the borings at the approximate interval from which they were extracted. Remaining uncontaminated soils will be spread evenly on the ground surface in unpaved areas, as agreed upon with the property owner and the NYSDEC.

Data Quality Objectives. Analytical DQOs for the Swalm Street site sampling activities are summarized in Table A-1. NYSDEC Analytical Services Protocols (ASP) (NYSDEC, 2005) methods will be used. Results will be evaluated by preparing a Data Usability Summary Report (DUSR) (NYSDEC, 2002).

Sample Identification. Sample collected for laboratory analysis will identified as follows:

<u>Sample Type</u>	<u>Nomenclature Sequence</u>	<u>Example ID</u>
Soil Vapor	DEC ID# - DP- ID – SV – Top Depth	130043P-DP1-SV50
Groundwater	DEC ID# - MW- ID – GW – Top Depth	130043P-MW1-GW5

DP = direct push
 SV = soil vapor
 MW = monitoring well
 GW = groundwater

REFERENCES

- MACTEC Engineering and Consulting, Inc., 2007. Program Quality Assurance Program Plan. Prepared for the New York State Department of Environmental Conservation, Albany, New York. October 2007.
- New York State Department of Environmental Conservation (NYSDEC), 2005. *Analytical Services Protocols*"; 6/05 Edition; June 2005.
- New York State Department of Environmental Conservation (NYSDEC), 2002. Draft DER-10, Technical Guidance for Site Investigation and Remediation. December 2002.
- U.S. Environmental Protection Agency (USEPA), 1987. "Data Quality Objectives for Remedial Response Activities"; Office of Emergency and Remedial Response and Office of Waste Programs Enforcement; Washington DC; EPA/540/G-87/003; March 1987.

**Table A-1:
 Analytical DQO Levels**

Parameter	Use	Data Quality Level
PH, Dissolved Oxygen Temperature Specific Conductance Turbidity	Provides physical and chemical data on groundwater samples for use during sampling collection.	Level I
PID screening	Provides qualitative real-time information on air quality in the breathing zone for health and safety decisions, and to identify potentially contaminated groundwater, soil, and soil gas.	Level I
TCL VOCs	Provides analytical information to compare to standards and guidance values.	<u>Level III</u> 8260B (water) TO-15 (soil vapor)

Notes:

TCL = target compound list

VOCs = volatile organic compounds

*Site Management Work Plan – 118-130 Swalm Street
NYSDEC – Site No. 1-30-043P
MACTEC Engineering and Consulting, P.C., Project No. 3612072097*

*June 2008
Final*

APPENDIX B

MACTEC SHORT FORM HASP and PROGRAM HEALTH AND SAFETY PLAN (on CD-ROM)

Site: 118-130 Swalm Street Site (Swalm Street) Job Number: 3612072097

Street Address: 118-130 Swalm Street, North Hempstead, New York

Proposed Date(s) of Investigation: June 1, 2008

Prepared by: Brandon Shaw Date: 03/06/2008

*Approved by: Cindy Sundquist Date: 03/14/2008

Site Description: The Swalm Street is located in the area known as NCIA, which has known chlorinated groundwater contamination. In 1988, the NYSDEC's subcontractors conducted many subsurface investigations to delineate the containment plume in groundwater. As of March 2004, eleven Sites located in the NCIA were listed as Class 2 Sites. The Site building has been industrially occupied since 1961.
Overburdened Well Installation, Low-Flow Groundwater Sampling and Soil Vapor

Proposed Activity(s): Sampling.

*Approval also serves as certification of a Hazard Assessment as required by 29 CFR 1910.132

Known or Suspected Contaminants (include PELs/TLVs):

Contaminants of Concern	PEL/TLV
SOILS:	
Tetrachloroethylene (570 ppb)	25 ppm
Trichloroethylene (23 ppb)	10 ppm
Toluene (25 ppb)	20 ppm
GROUNDWATER:	
Tetrachloroethylene (1,800 ppb)	25 ppm
Trichloroethylene (100 ppb)	10 ppm
Cis-1,2-dichloroethylene (1.2 ppb)	200 ppm
Vinyl Chloride	1 ppm

JHAs: Check and attach all that apply:
Activity Specific JHAs:

☒	Mobilization/Demobilization and Site Preparation
☒	Field Work - General
☒	Groundwater Monitoring
☒	Environmental Drilling (pre and post work) (MACTEC Oversight)
☐	Soil Sampling
☒	Geoprobe
☐	Excavations and Backfilling
☒	Decontamination
☐	Stream/Wetlands Work
☐	Clearing Brush and Trees
☐	Chain Saw
☒	Handling of Gas Cylinders

Activity Specific JHAs:

☐	Insect Stings and Bites
☐	Gasoline
☒	Working with Preservatives (Acids)
☐	Pore Water Sampling
☒	Well Development
☐	Power Tool Use - Electrical
☐	Groundwater Level Monitoring
☐	Indoor Air Sampling
☐	Sump Sampling
☐	
☐	

Chemicals Brought to the Site:

List all chemicals brought to the site (e.g., preservatives, decontamination solutions, gasoline, etc.). Attach MSDS

Chemicals	MSDS Attached?
HYDROCHLORIC ACID, NITRIC ACID, SULFURIC ACID, SODIUM HYDROXIDE	☒

Chemicals will be kept in their original containers. If transferred to another container, aside from days use by one individual, the new container will be labeled with the name of the chemical and the hazard warnings.

HAZARD IDENTIFICATION SUMMARY

Complete the checklist for summarizing the hazards identified in the JHAs

Standard Hazards			
☒ Falling Objects	☒ Slips and trips	☒ Pinch points	☒ Rotating equipment
☒ Falls	☒ Power equipment/tools	☐ Elevated work surfaces	☐ _____
Eye Hazards			
☒ Particulates	☒ Liquid splashes	☐ Welding Arc	☐ _____
Hearing Hazards			
☐ None	☒ Impact noise	☐ High frequency noise	☒ High ambient noise
Respiratory Hazards			
☐ None	☒ Dust/aerosols/particulates	☒ Organic Vapors	☐ Acid Gases
☐ Oxygen deficient	☐ Metals	☐ Asbestos	☐ _____
Chemical Hazards			
☐ None	☒ Organic solvents	☐ Reactive metals	☐ PCBs
☒ Acids / bases	☐ Oxidizers	☒ Volatiles/Semi-volatiles	☐ _____
Environmental Hazards			
☐ None	☒ Temperature extremes ☒ Cold ☒ Heat	☒ Wet location	☐ Bio hazards (snakes, insects, spiders, poisonous plants, etc.)
☐ Explosive vapors	☐ Confined space	☐ Engulfment Hazard	☐ _____
Electrical Hazards			
☐ None	☐ Energized equipment or circuits	☐ Overhead utilities ☒ Underground utilities	☐ Wet location
Fire Hazards			
☒ None	☐ Cutting, welding, or grinding generated sparks or heat sources	☐ Flammable materials present	☐ Oxygen enriched location
Ergonomic Hazards			
☒ Lifting	☒ Bending	☒ Twisting	☒ Pulling/tugging
Computer Use in the: ☐ Office ☐ Field	☐ Repetitive motion	☒ Carrying	☐ _____
Radiological Hazards			
☒ None	☐ Alpha	☐ Beta	☐ Gamma/X-rays
☐ Neutron	☐ Radon	☐ Non-Ionizing	☐ _____
Other Hazards			
☒ None Known			

PPE and Monitoring Instruments

Initial Level of PPE *			
☒ Level D	☐ Modified Level D	☐ Level C	* Cannot use Short Form HASP for Level B or A work
Standard PPE			
☒ Hard Hat	☒ Safety boots	☒ Safety glasses	☐ Chemical Resistant Boots
☒ High visibility vest	☐ Other: _____		
Eye and Face Protection			
☐ Face shield	☐ Vented goggles	☐ Unvented goggles	☐ Indirect vented goggles
Hearing Protection			
☒ Ear plugs	☒ Ear Muffs	☐ Ear plugs and muffs	☐ Other _____
Respiratory Protection			
☒ None	☐ Dust mask	☐ Full Face APR ☐ Half Face APR	Cartridge Type: N/A Change Cartridges: N/A
Protective Clothing			
☐ White uncoated Tyvek®	☐ Poly-coated Tyvek®	☐ Saranex®	☐ Work uniform
☐ Boot covers	☐ Reflective vest	☐ Chap or Snake Legs	☐ Other _____
Hand Protection			
☐ None	☒ Cotton gloves	☒ Leather gloves	☐ Glove liners
☒ Outer Gloves List Type <u>Nitrile</u>	☐ Inner Gloves List Type _____	☐ Cut-resistant gloves	☐ Other _____
Monitoring Instruments Required			
☐ LEL/O2 Meter	☒ PID ☒ 10-10.6 eV Lamp ☐ 11.7 eV Lamp	☐ FID	☐ Hydrogen Sulfide/Carbon Monoxide
☒ Dräger Pump (or equivalent) List Tubes <u>Vinyl Chloride</u>	☐ Dust Meter ☐ Respirable dust ☐ Total dust	☐ Other _____	

Air Monitoring Action Levels:

PID/FID Reading ¹	Detector Tube ¹	Dust Meter ¹	Action	Level of PPE
At Background	< 0.5ppm Vinyl Chloride or staining	No visible dust (below 2.5 mg/m ³)	Work as usual	Level D
Above Background >4 ppm			Monitor Breathing Zone with Vinyl Chloride Dräger Tube	
	< 0.5ppm Vinyl Chloride or staining	No visible dust (below 2.5 mg/m ³)	Cease work, re-evaluate situation. Contact Division EH&S Manager.	Level C
	N/A	>Visual dust present - 2.5 mg/m ³	Move upwind. Implement dust control measures. If dust persists, cease work and consult H&S Officer.	Level D
	> 0.5 ppm VC	N/A	Back off - cease work and consult H&S Officer.	

¹ Sustained readings measured in the breathing zone

² Readings at measured at the source (borehole, well, etc.)

PPE Selection Guidelines

When selecting the appropriate PPE for the job, consider the following:

- **Safety glasses** – general eye protection – source of hazard, typically coming from straight on, required at most sites
- **Tinted Safety Glasses** – same as above, but when working in direct sunlight. May need two both tinted and untinted if working in both sunlight and shade/overcast skies.
- **Safety goggles** – needed for splash hazard, more severe eye exposures coming from all directions. Non-vented or indirect venting for chemical splash, non-vented for hazardous gases or very fine dust, vented for larger particulates coming from all directions.
- **Face shield** – needed to protect face from cuts, burns, chemicals (corrosives or chemicals with skin notation), etc.
- **Safety boots** – needed if danger of items being dropped on foot that could injure foot
- **Hard hat** – danger from items falling on head – any overhead work, tools, equipment, etc that is above the head and could fall on head if item fails, or falls off work platform. Typically required at most sites as a general PPE
- **Thin, chemical protective inner gloves** (e.g., thin Nitrile, PVC – do not use latex – many people are allergic to latex) –needed to protect hands from incidental contact with low risk contamination at very low concentrations (ppb or low ppm concentrations in groundwater or soil) or used in combination with outer gloves as a last defense against contamination. Need to specify type
- **Outer gloves** – thicker gloves (e.g., Nitrile, Butyl, Viton, etc.) – used when potential for high concentrations of contaminants (e.g., floating product, percent ranges of contaminant, opening drums, handling pure undiluted chemicals, etc.). Need to specify type.
- **Leather gloves, leather palm, and cotton** – good in protecting hands against cuts – no protection from chemicals. May be used in combination with chemical protective gloves.
- **Boot Covers** – when there is contamination in surface soils or working surface in general. When safety boots need protection from contact with contaminants.
- **White (uncoated) Tyveks** – protect clothing from getting dirty, good for protection against solid, non-volatile chemicals (e.g., asbestos, metals) – no chemical protection.
- **Polycoated Tyveks** – least protective of chemical protective clothing. Used when some risk of contamination getting on skin or clothing. Usually, lower ppm ranges of contaminants.
- **Saranex** – Greater protection against contamination than Polycoated Tyveks. Used to protect against PCBs or higher concentrations of contaminants in the soil or groundwater.

- **Other Chemical protective clothing** – if significant risk of dermal exposure, contact H&S to determine best kind.
- **Long sleeved shirts, long pants** – if working in areas with poison ivy/oak/sumac, poisonous insects, etc. and no chemicals exposure. May want to use uncoated Tyveks for work in areas where poisonous plants are known to be to protect clothing.
- **Cartridge Respirator (Level C PPE)** – Need to calculate change schedule (contact Division EH&S Manager for this) to determine length of use. To be able to use cartridge respirators, need to know contaminants, estimate levels to be encountered in the breathing zone, need to ensure that cartridge will be effective against COCs, and need to be able to monitor for COCs using PID, FID, Dräger tubes, etc. If can't do any of these, then Level B PPE is probably going to be needed.
- **High Visibility Vest** – needed for any road work (within 15 feet of a road) or when working on a site with vehicular traffic or working around heavy equipment. Needed if work tasks would take employee concentration away from movement of vehicles and workers would have to rely on the other driver's ability to see the employee in order not to hit them. This includes heavy equipment as well as cars and trucks, on public roads or the jobsite. Not needed if wearing Polycoated Tyveks – as they are already high visibility.
- **Reflective Vest** – see above, but for use at night.
- **Hearing Protection** – needed if working at noise levels above 85 dBA on a time weighted average. If noise measurements are not available, use around noisy equipment, or in general, if you have to raise your voice to be heard when talking to someone standing two feet away.
- **Protective Chaps** – required when using a machete or chain saw or any other cut hazard to legs.

Work Zones:

The work zones will be defined relative to the location of the work activity. The Exclusion Zone is considered the area within a 10-foot diameter of the sampling location. The Contamination Reduction Zone is considered to be the area within a 20-foot diameter of the sampling location. The decontamination zone being located upwind of the work area. Work zones will be maintained through the use of:

_____ Warning Tape
☒ Visual Observations

Site Communication:

☒ Verbal
☒ Two-way radio
☒ Cellular telephone
 _____ Hand signals

- Hand gripping throat Out of air, can't breathe
- Grip partner's wrist or both hands around waist Leave area immediately
- Hands on top of head Need assistance
- Thumbs up OK, I am all right, I understand
- Thumbs down No, negative

☒ Horn

EMERGENCY CONTACTS

NAME	TELEPHONE NUMBERS	DATE OF PRE-EMERGENCY NOTIFICATION (if applicable)
Fire Department:	911	

Primary Hospital: Nassau University Medical Center	516-72-0123		
Alternate Hospital: New Island Hospital	516-572-6229		
Police Department:	911		
Site Health And Safety Officer: Jerry Rawcliff	Office: 207-775-5401	Home:	
Client Contact: NYSDEC Joseph Jones	Office: 518-402-9621	Pager:	
Project Manager: Jayme Connolly	Office: 207-775-5401	Home:	
Division EH&S Manager: Cindy Sundquist	Office: 207-828-3309 (w) 207-650-7593(c)	Home: 207-892-4402	
OTHER: Ambulance	911		
Health Resources	800-350-4511		

Emergency Equipment:

The following emergency response equipment is required for this project and shall be readily available:

- ☒ Field First Aid Kit
- ☒ Fire Extinguisher (ABC type) – May be the Drillers
- ☐ Eyewash (Note: 15 minutes of free-flowing fresh water)
- ☐ Other: _____

EMERGENCY PROCEDURES

The HSO (or alternate) should be immediately notified via the on-site communication system. The HSO assumes control of the emergency response.

- The HSO notifies the Project Manager and client contact of the emergency. The HSO shall then contact the Division ES&H Manager who will then contact the Corporate EH&S Manager.

If applicable, the HSO shall notify off-site emergency responders (e.g. fire department, hospital, police department, etc.) and shall inform the response team as to the nature and location of the emergency on-site.

- If applicable, the HSO evacuates the site. Site workers should move to the predetermined evacuation point (See Site Map).
- For small fires, flames should be extinguished using the fire extinguisher. Large fires should be handled by the local fire department.
- In an unknown situation or if responding to toxic gas emergencies, appropriate PPE, including SCBAs (if available), should be donned. If appropriate PPE is unavailable, site workers should evacuate and call in emergency personnel.
- If chemicals are accidentally spilled or splashed into eyes or on skin, use eyewash and wash affected area. Site worker should shower as soon as possible after incident.
- If a worker is injured, first aid shall be administered by certified first aid provider.

FIELD TEAM REVIEW: I acknowledge that I understand the requirements of this HASP, and agree to abide by the procedures and limitations specified herein. I also acknowledge that I have been given an opportunity to have my questions regarding the HASP and its requirements answered prior to performing field activities. Health and safety training and medical surveillance requirements applicable to my field activities at this site are current and will not expire during on-site activities.

Name: _____	Date: _____
Name: _____	Date: _____
Name: _____	Date: _____
Name: _____	Date: _____
Name: _____	Date: _____

Routes to Emergency Medical Facilities

PRIMARY HOSPITAL:

Facility Name: Nassau University Medical Center

Address: 2201 Hempstead Turnpike, East Meadow, New York 11554

Telephone Number: (516) 572-0123

DIRECTIONS TO PRIMARY HOSPITAL (attach map): Appendix C-1

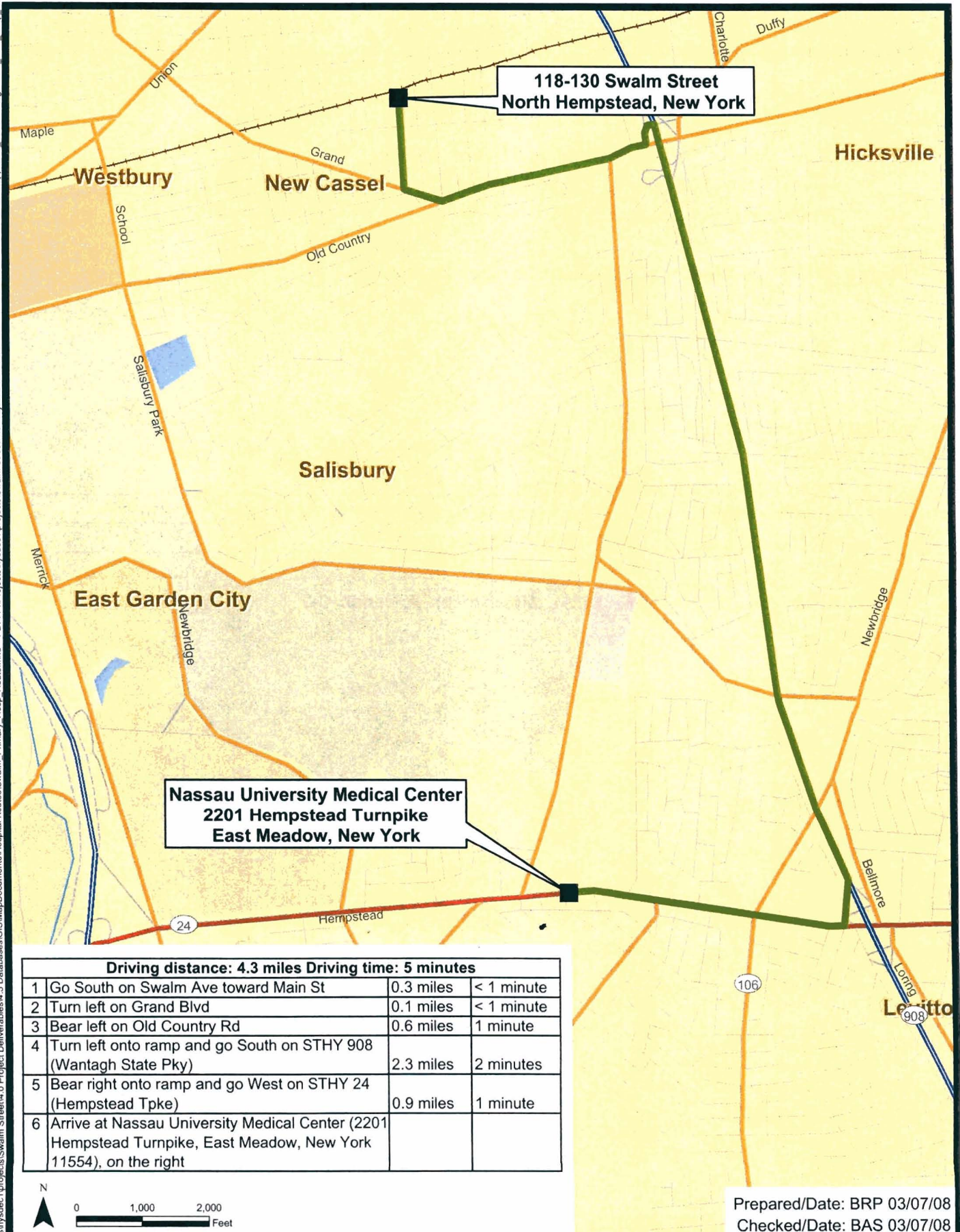
ALTERNATE HOSPITAL:

Facility Name: New Island Hospital

Address: 4295 Hempstead Turnpike, Bethpage, New York 11710

Telephone Number (516) 572-6229

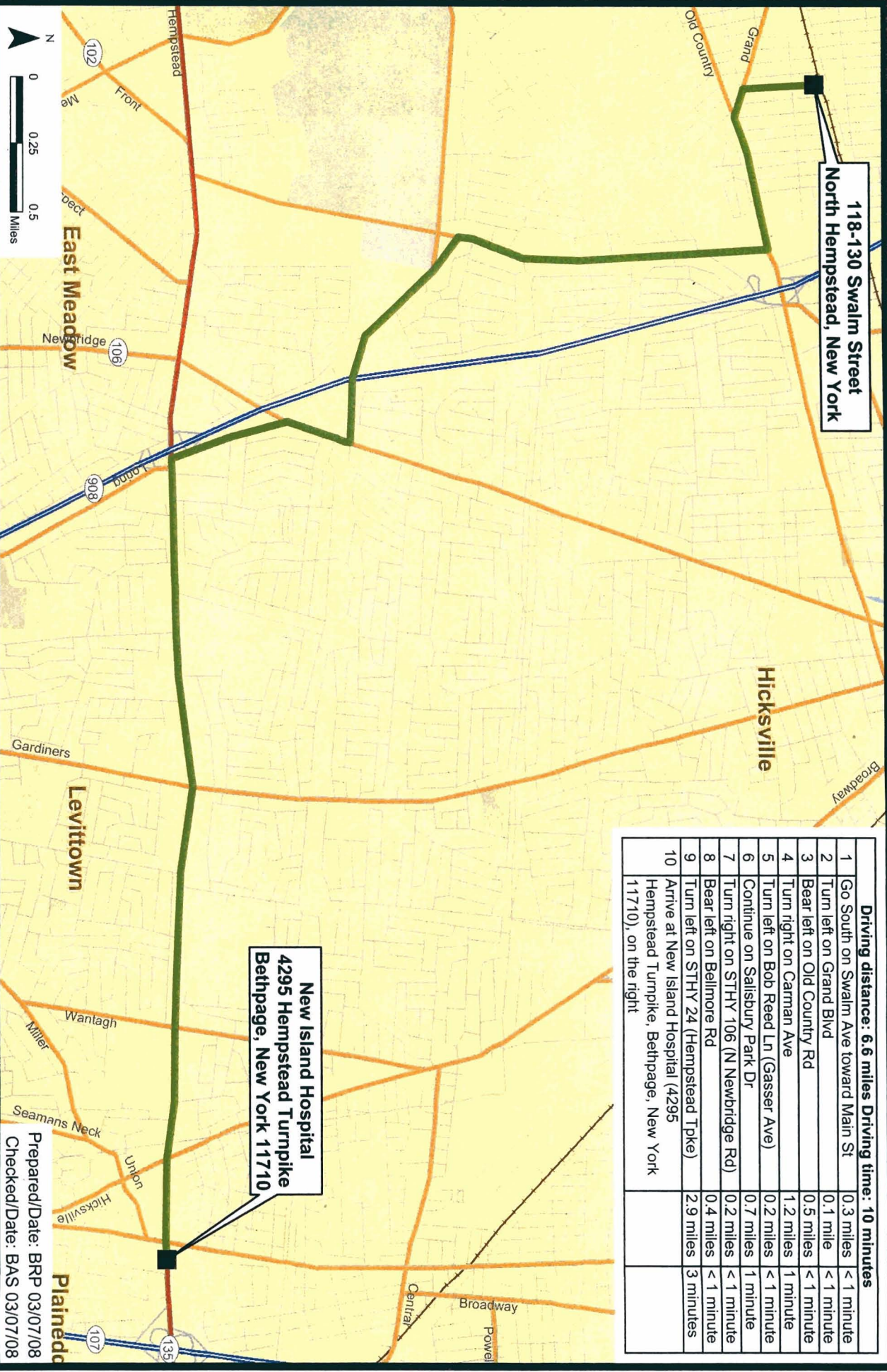
DIRECTIONS TO ALTERNATE HOSPITAL (attach map): Appendix C-2



SITE MANAGEMENT WORK PLAN
118-130 SWALM STREET SITE
NORTH HEMPSTEAD, NEW YORK



PRIMARY HOSPITAL ROUTE
NASSAU UNIVERSITY MEDICAL CTR
Project 3612-07-2097
Figure C-1



Driving distance: 6.6 miles Driving time: 10 minutes			
1	Go South on Swalm Ave toward Main St	0.3 miles	< 1 minute
2	Turn left on Grand Blvd	0.1 mile	< 1 minute
3	Bear left on Old Country Rd	0.5 miles	< 1 minute
4	Turn right on Carman Ave	1.2 miles	1 minute
5	Turn left on Bob Reed Ln (Gasser Ave)	0.2 miles	< 1 minute
6	Continue on Salisbury Park Dr	0.7 miles	1 minute
7	Turn right on STHY 106 (N Newbridge Rd)	0.2 miles	< 1 minute
8	Bear left on Bellmore Rd	0.4 miles	< 1 minute
9	Turn left on STHY 24 (Hempstead Tpke)	2.9 miles	3 minutes
10	Arrive at New Island Hospital (4295 Hempstead Turnpike, Bethpage, New York 11710), on the right		

New Island Hospital
4295 Hempstead Turnpike
Bethpage, New York 11710

SITE MANAGEMENT WORK PLAN
118-130 SWALM STREET SITE
NORTH HEMPSTEAD, NEW YORK



SECONDARY HOSPITAL ROUTE
New Island Hospital
Project 3612-07-2097
Figure C-2

Prepared/Date: BRP 03/07/08
Checked/Date: BAS 03/07/08

Job Hazard Analysis Form

JHA No.: JHA - - - -

Job Title: Mobilization/Demobilization, Site Preparation Date of Analysis: 5/1/07

Job Location: 118-130 Swalm Street, North Hempstead, NY Team Leader: Jayme Connolly

Applicable ES&H Procedures:

- 2.9.A - Hazardous Waste Operations and Emergency Response Program
- 2.9.B - Hearing Conservation Program
- 2.9.C - Respiratory Protection Program
- 2.9.D - Personal Protective Equipment Program
- 2.9.E - Hazard Communication Program
- 2.5.1 - Operation of Company Vehicles and Use of Personal Vehicles on Company Business
- 2.5.1 - Heavy Equipment
- 2.13.1 - Medical Surveillance

Other Referenced JHAs:

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Prepare for Site Visit	1A) N/A	1A) Prior to leaving for site - Obtain and review HASP prior to site visit, if possible - Determine PPE needs – bring required PPE to the site, if not otherwise being provided at the site (e.g., steel toed boots) - Determine training and medical monitoring needs and ensure all required Health and Safety training and medical monitoring has been received and is current - Ensure all workers are fit for duty (alert, well rested, and mentally and physically fit to perform work assignment) - If respiratory protection is required/potentially required, ensure that training and fit-testing has occurred within the past year. - Familiarize yourself with route to the site
	1B) Vehicle defects	1B) Inspect company owned/leased vehicle for defects such as: - Flat tires - Windshield wipers worn or torn - Oil puddles under vehicle - Headlights, brake lights, turn signals not working
	1C) Insufficient emergency equipment, unsecured loads	1C) Insufficient emergency equipment, unsecured loads - Ensure vehicle has first aid kit and that all medications are current (if first aid kits are not provided at the site) - Ensure vehicle is equipped with warning flashers and/or flares and that the warning flashers work - Cell phones are recommended to call for help in the event of an emergency - Vehicles carrying tools must have a safety cage in place. All tools must be properly secured - Vehicles must be equipped with chocks if the vehicle is to be left running, unattended. - Ensure sufficient gasoline is in the tank

Key Work Steps	Hazards/Potential Hazards	Safe Practices
2. Operating vehicles – general	2A) Collisions, unsafe driving conditions	2A) Drive Defensively! ▪ Seat belts must be used at all times when operating any vehicle on company business. ▪ Drive at safe speed for road conditions ▪ Maintain adequate following distance ▪ Pull over and stop if you have to look at a map ▪ Try to park so that you don't have to back up to leave. ▪ If backing in required, walk around vehicle to identify any hazards (especially low level hazards that may be difficult to see when in the vehicle) that might be present. Use a spotter if necessary
3. Driving to the jobsite	3A) Dusty, winding, narrow roads	3A) Dusty, winding, narrow roads ▪ Drive confidently and defensively at all times. ▪ Go slow around corners, occasionally clearing the windshield.
	3B) Rocky or one-lane roads	3B) Rocky or one-lane roads ▪ Stay clear of gullies and trenches, drive slowly over rocks. ▪ Yield right-of-way to oncoming vehicles---find a safe place to pull over.
	3C) Stormy weather, near confused tourists	3C) Stormy weather, near confused tourists ▪ Inquire about conditions before leaving the office. ▪ Be aware of oncoming storms. ▪ Drive to avoid accident situations created by the mistakes of others.
	3D) When angry or irritated	3D) When angry or irritated ▪ Attitude adjustment; change the subject or work out the problem before driving the vehicle. Let someone else drive.
	3E) Turning around on narrow roads	3E) Turning around on narrow roads ▪ Safely turn out with as much room as possible. ▪ Know what is ahead and behind the vehicle. ▪ Use a backer if available.
	3F) Sick or medicated	3F) Sick or medicated ▪ Let others on the crew know you do not feel well. ▪ Let someone else drive.
	3G) On wet or slimy roads	3G) On wet or slimy roads ▪ Drive slow and safe, wear seatbelts.
	3H) Animals on road	3H) Animals on road ▪ Drive slowly, watch for other animals nearby. ▪ Be alert for animals darting out of wooded areas
4. Gain permission to enter site	4A) Hostile landowner, livestock, pets	4A) Hostile landowner, livestock, pets ▪ Talk to land owner, be courteous and diplomatic ▪ Ensure all animals have been secured away from work area
5. Mobilization/ Demobilization of Equipment and Supplies	5A) Struck by Heavy Equipment/Vehicles	5A) Struck by heavy equipment ▪ Be aware of heavy equipment operations. ▪ Keep out of the swing radius of heavy equipment. ▪ Ground personnel in the vicinity of heavy equipment operations will be within the view of the operator at all times ▪ Employees shall wear a high visibility vest or T-shirt (reflective vest required if working at night). ▪ Ground personnel will be aware of the counterweight swing and maintain an adequate buffer zone. ▪ Ground personnel will not stand directly behind heavy equipment when it is in operation.

Issued: **1/23/06** Effective: **1/24/06** **ESH-2.9.1 REVISION 2**

Owner: **H.J. Gordon** Approver: **S. D. Rima** **PAGE 3 OF 3**

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	5B) Struck by Equipment/Supplies	5B) Struck by Equipment/Supplies - Workers will maintain proper space around their work area, if someone enters it, stop work. - When entering another worker's work space, give a verbal warning so they know you are there.
	5C) Overexertion Unloading/Loading Supplies	5C) Overexertion Unloading/Loading Supplies - Train workers on proper body mechanics, do not bend or twist at the waist while exerting force or lifting. - Tightly secure all loads to the truck bed to avoid load shifting while in transit.
	5D) Caught in/on/between	5D) Caught in/on/between Do not place yourself between two vehicles or between a vehicle and a fixed object.
	5E) Slip/Trip/Fall	5E) 1E) Slip/Trip/Fall - Mark all holes and low spots in area with banner tape. Instruct personnel to avoid these areas. - Drivers will maintain 3 point contact when mounting/dismounting vehicles/equipment. - Drivers will check surface before stepping, not jumping down.
	5F) Vehicle Incident	5F) Vehicle accident Employees should follow MACTEC vehicle operation policy and be aware of all stationary and mobile vehicles.
6. Site Preparation	6A) Slip/Trip/Fall	6A) Slip/Trip/Fall Mark all holes and low spots in area with banner tape. Instruct personnel to avoid these areas
	6B) Overexertion	6B) Overexertion - Workers will be trained in the proper method of lifting items. - Do not bend and twist at the waist while lifting or exerting force.
	6C) Struck by Equipment/Supplies	6C) Struck by Equipment/Supplies - Workers will maintain proper space around their work area, if someone enters it, stop work. - When entering another worker's work space, give a verbal warning so they know you are there.
7. Driving back from the jobsite	8A) See hazards listed under item #3	8A) See safe work practices under item #3

Job Hazard Analysis Form

JHA No.: JHA - _____ - _____ - _____ - _____

Job Title: Field Work – General

Date of Analysis: 5/3/07

Job Location: 118-130 Swalm Street, North Hempstead, NY **Team Leader:** Jayme Connolly

Applicable ES&H Procedures:

- 2.9.A - Hazardous Waste Operations and Emergency Response Program
- 2.9.B - Hearing Conservation Program
- 2.9.C - Respiratory Protection Program
- 2.9.D - Personal Protective Equipment Program
- 2.9.E - Hazard Communication Program
- 2.5.1 - Operation of Company Vehicles and Use of Personal Vehicles on Company Business
- 2.5.1 - Heavy Equipment
- 2.9.7 - Overhead and Underground Utilities
- 2.9.8 - Permit-Required Confined Space
- 2.9.16 - Thermal Stress
- 2.9.19 - Electrical Safety
- 2.9.20 - Lockout / Tagout
- 2.9.21 - Power and Hand Tools
- 2.13.1 - Medical Surveillance

Other Referenced JHAs:

Mobilization/Demobilization and Site Preparation
 Insect Stings and Bites
 Poisonous Plants
 Confined Space Entry

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Mobilization/ Demobilization and Site Preparation	1A) See Mobilization / Demobilization and Site Preparation JHA	1A) See Mobilization/Demobilization and Site Preparation JHA
2. Communication	2A) Safety, crew unity	2A) Talk to each other. ▪ Log all workers and visitor on and off the site. ▪ Let other crewmembers know when you see a hazard. ▪ Avoid working near known hazards. ▪ Always know the whereabouts of fellow crewmembers. ▪ Carry a radio and spare batteries or cell phone ▪ Review Emergency Evacuation Procedures (see below).
3. Walking and working in the field	3A) Falling down, twisted ankles and knees, poor footing	3A) Always watch your footing. ▪ Horseplay is strictly prohibited ▪ Slow down and use extra caution around logs, rocks, and animal holes. ▪ Extremely steep slopes (>50%) can be hazardous under wet or dry conditions; consider an alternate route. ▪ Wear laced boots with a minimum 8" high upper and non-skid Vibram-type soles for ankle support and traction.
	3B) Falling objects	3B) Protect head against falling objects. ▪ Wear your hardhat for protection from falling limbs and pinecones, and from tools and equipment carried by other crewmembers. ▪ Stay out of the woods during extremely high winds.

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3C) Chemical/Toxicological Hazards	3C) Chemical/Toxicological Hazards - See HASP for appropriate level of PPE - Use monitoring equipment, as outlined in HASP, to monitor breathing zone - Read MSDSs for all chemicals brought to the site - Be familiar with hazards associated with site contaminants. - Ensure that all containers are properly labelled - Decon thoroughly prior to consumption of food, beverage or tobacco.
	3D) Damage to eyes	3D) Protect eyes: - Watch where you walk, especially around trees and brush with limbs sticking out. - Exercise caution when clearing limbs from tree trunks. Advise wearing eye protection. - Ultraviolet light from the sun can be damaging to the eyes; look for sunglasses that specify significant protection from UV-A and UV-B radiation. If safety glasses require, use one's with tinted lenses
	3E) Bee and wasp stings	3E) See JHA for Insect Stings and Bites
	3F) Ticks and infected mosquitos	3F) See JHA for Insect Stings and Bites
	3G) Wild Animals	3G) Wild Animals - Avoid physical contact with wild animals - Do not threaten and/or corner animals - Make noise to get the animal to retreat. - Stay in or return to vehicle/equipment if in danger
	3H) Contact with poisonous plants or the oil from those plants:	3H) Contact with poisonous plants or the oil from those plants: - Look for signs of poisonous plants and avoid. - Ensure all field workers can identify the plants. Mark identified poisonous plants with spray paint if working at a fixed location. - Do not allow plant to touch any part of your body/clothing. - Wear PPE as described in the HASP and wear Tyveks, gloves and boot covers if contact with plant is likely - Always wash gloves before removing them. - Discard PPE in accordance with the HASP. - Use commercially available products such as Ivy Block or Ivy Wash as appropriate. - See the JHA for Poisonous Plants
		 POISON IVY <i>(Rhus toxicodendron L.)</i> POISON OAK <i>(Rhus diversiloba)</i> POISON SUMAC <i>(Rhus toxicodendron vernix)</i>
	3I) Back Injuries	3I) Back Injuries - Site personnel will be instructed on proper lifting techniques. - Mechanical devices should be used to reduce manual handling of materials. - Split heavy loads in to smaller loads - Team lifting should be utilized if mechanical devices are not available. - Make sure that path is clear prior to lift.

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3J) Shoveling	3J) Shoveling ▪ Select the proper shovel for the task. A long handled, flat bladed shovel is recommend for loose material ▪ Inspect the handle for splinters and/or cracks ▪ Ensure that the blade is securely attached to the handle ▪ Never be more than 15 inches from the material you are shoveling ▪ Stand with your feet about hip width for balance and keep the shovel close to your body. ▪ Bend from the knees (not the back) and tighten your stomach muscles as you lift. ▪ Avoid twisting movements. If you need to move the snow to one side reposition your feet to face the direction the snow will be going. ▪ Avoid lifting large shoveling too much at once. When lifting heavy material, pick up less to reduce the weight lifted. ▪ Pace yourself to avoid getting out of breath and becoming fatigued too soon. ▪ Be alert for signs of stress such as pain, numbness, burning and tingling. Stop immediately if you feel any of these symptoms.
	3K) Slips/Trips/Falls	3K) Slips/Trips/Falls ▪ Maintain work areas safe and orderly; unloading areas should be on even terrain; mark or repair possible tripping hazards. ▪ Site SHSO inspect the entire work area to identify and mark hazards. ▪ Maintain three points of contact when climbing ladders or onto/off of equipment
	3L) Overhead Hazards	3L) Overhead Hazards ▪ Personnel will be required to wear hard hats that meet ANSI Standard Z89.1. ▪ All ground personnel will stay clear of suspended loads. ▪ All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects. ▪ All overhead hazards will be identified prior to commencing work operations.
	3M) Dropped Objects	3M) Dropped Objects ▪ Steel toe boots meeting ANSI Standard Z41 will be worn.
	3N) Noise	3N) Noise ▪ Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs); all equipment will be equipped with manufacturer's required mufflers. Hearing protection shall be worn by all personnel working in or near heavy equipment.
	3O) Eye Injuries	3O) Eye Injuries ▪ Safety glasses meeting ANSI Standard Z87 will be worn.

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3P) Heavy Equipment (overhead hazards, spills, struck by or against)	3P) Heavy Equipment ▪ All operators will be trained and qualified to operate equipment ▪ Equipment will have seat belts. ▪ Operators will wear seat belts when operating equipment. ▪ Do not operate equipment on grades that exceed manufacturer's recommendations. ▪ Equipment will have guards, canopies or grills to protect from flying objects. ▪ Ground personnel will stay clear of all suspended loads. ▪ Personnel are prohibited from riding on the buckets, or elsewhere on the equipment except for designated seats with proper seat belts or lifts specifically designed to carry workers. ▪ Ground personnel will wear high visibility vests ▪ Spill and absorbent materials will be readily available. ▪ Drip pans, polyethylene sheeting or other means will be used for secondary containment. ▪ Ground personnel will stay out of the swing radius of excavators. ▪ Eye contact with operators will be made before approaching equipment. ▪ Operator will acknowledge eye contact by removing his hands from the controls. ▪ Equipment will not be approached on blind sides. ▪ All equipment will be equipped with backup alarms and use spotters when significant physical movement of equipment occurs on-site, (i.e., other than in place excavation or truck loading). ▪ Inspect rigging prior to each use.
	3Q) Struck by vehicle/equipment	3Q) Struck by vehicle/equipment ▪ Be aware of heavy equipment operations. ▪ Keep out of the swing radius of heavy equipment. ▪ Ground personnel in the vicinity of vehicles or heavy equipment operations will be within the view of the operator at all times. ▪ Ground personnel will be aware of the counterweight swing and maintain an adequate buffer zone. ▪ Ground personnel will not stand directly behind heavy equipment when it is in operation. ▪ Drivers will keep workers on foot in their vision at all times, if you lose sight of someone, Stop! ▪ Spotters will be used when backing up trucks and heavy equipment and when moving equipment. ▪ High visibility vests will be worn when workers are exposed to vehicular traffic at the site or on public roads.
	3R) Struck/cut by tools	3R) Struck/cut by tools ▪ Cut resistant work gloves will be worn when dealing with sharp objects. ▪ All hand and power tools will be maintained in safe condition. ▪ Do not drop or throw tools. Tools shall be placed on the ground or worksurface or handed to another employee in a safe manner. ▪ Guards will be kept in place while using hand and power tools.
	3S) Caught in/on/between	3S) Caught in/on/between ▪ Workers will not position themselves between equipment and a stationary object. ▪ Workers will not wear long hair down (place in pony-tail and tuck into shirt) or jewelry if working with tools/machinery.

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3T) Contact with Electricity/Lightning	3T) Contact with Electricity/Lighting ▪ All electrical tools and equipment will be equipped with GFCI. ▪ Electrical extension cords will be of the "Hard" or "Extra Hard" service type. ▪ All extension cords shall have a three-blade grounding plug. ▪ Personnel shall not use extension cords with damaged outer covers, exposed inner wires, or splices. ▪ Electrical cords shall not be laid across roads where vehicular traffic may damage the cord without appropriate guarding. ▪ All electrical work will be conducted by a licensed electrician. ▪ All equipment will be locked out and tagged out and rendered in a zero energy state prior to commencing any operation that may expose workers to electrical, mechanical, hydraulic, etc. hazards. ▪ All utilities will be marked prior to excavation activities. ▪ All equipment will stay a minimum of 10 feet from overhead energized electrical lines (50 kV). This distance will increase by 4 inches for each 10 kV above 50 kV. Rule of Thumb: Stay 10 feet away from all overhead powerlines known to be 50 kV or less and 35 feet from all others.) ▪ The SHSO shall halt outdoor site operations whenever lightning is visible, outdoor work will not resume until 30 minutes after the last sighting of lightning.
	3U) Equipment failure	3U) Equipment failure ▪ All equipment will be inspected before use. If any safety problems are noted, the equipment should be tagged and removed from service until repaired or replaced.
	3V) Hand & power tool usage.	3V) Hand & power tool usage ▪ Daily inspections will be performed. ▪ Ensure guards are in place and are in good condition. ▪ Remove broken or damaged tools from service. ▪ Use the tool for its intended purpose. ▪ Use in accordance with manufacturers instructions. ▪ No tampering with electrical equipment is allowed (e.g., splicing cords, cutting the grounding prong off plug, etc.) ▪ See JHA for Power Tool Use - Electrical and Power Tool Use - Gasoline
	3W) Fire Protection	3W) Fire Protection ▪ Ensure that adequate number and type of fire extinguishers are present at the site ▪ Inspect fire extinguishers on a monthly basis – document ▪ All employees who are expected to use fire extinguishers will have received training on an annual basis. ▪ Obey no-smoking policy ▪ Open fires are prohibited ▪ Maintain good housekeeping. Keep rubbish and combustibles to a minimum. ▪ Keep flammable liquids in small containers with lids closed or a safety can. ▪ When dispensing flammable liquids, do in well vented area and bond and ground containers.
	3X) Confined Space Entry	3X) Confined Space Entry ▪ See JHA for Confined Space Entry

Key Work Steps	Hazards/Potential Hazards	Safe Practices						
4. Environmental health considerations	4A) Heat Stress	4A) Take precautions to prevent heat stress ▪ Remain constantly aware of the four basic factors that determine the degree of heat stress (air temperature, humidity, air movement, and heat radiation) relative to the surrounding work environmental heat load. ▪ Know the signs and symptoms of heat exhaustion, heat cramps, and heat stroke. Heat stroke is a true medical emergency requiring immediate emergency response action. NOTE: The severity of the effects of a given environmental heat stress is decreased by reducing the work load, increasing the frequency and/or duration of rest periods, and by introducing measures which will protect employees from hot environments. ▪ Maintain adequate water intake by drinking water periodically in small amounts throughout the day (flavoring water with citrus flavors or extracts enhances palatability). ▪ Allow approximately 2 weeks with progressive degrees of heat exposure and physical exertion for substantial acclimatization. ▪ Acclimatization is necessary regardless of an employee's physical condition (the better one's physical condition, the quicker the acclimatization). Tailor the work schedule to fit the climate, the physical condition of employees, and mission requirements. ▪ A reduction of work load markedly decreases total heat stress. ▪ Lessen work load and/or duration of physical exertion the first days of heat exposure to allow gradual acclimatization. ▪ Alternate work and rest periods. More severe conditions may require longer rest periods and electrolyte fluid replacement.						
	4B) Wet Bulb Globe Temperature (WBGT) Index	4B) WBGT ▪ Curtail or suspend physical work when conditions are extremely severe (see attached Heat Stress Index). ▪ Compute a Wet Bulb Globe Temperature Index to determine the level of physical activity (take WBGT index measurements in a location that is similar or closely approximates the environment to which employees will be exposed).						
		WBGT THRESHOLD VALUES FOR INSTITUTING PREVENTIVE MEASURES						
		<table><tr><td>80-90 degrees F</td><td>Fatigue possible with prolonged exposure and physical activity.</td></tr><tr><td>90-105 degrees F</td><td>Heat exhaustion and heat stroke possible with prolonged exposure and physical activity.</td></tr><tr><td>105-130 degrees F</td><td>Heat exhaustion and heat stroke are likely with prolonged heat exposure and physical activity.</td></tr></table>	80-90 degrees F	Fatigue possible with prolonged exposure and physical activity.	90-105 degrees F	Heat exhaustion and heat stroke possible with prolonged exposure and physical activity.	105-130 degrees F	Heat exhaustion and heat stroke are likely with prolonged heat exposure and physical activity.
80-90 degrees F	Fatigue possible with prolonged exposure and physical activity.							
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105-130 degrees F	Heat exhaustion and heat stroke are likely with prolonged heat exposure and physical activity.							
	4C) Cold Extremes	4C) Take precautions to prevent cold stress injuries ▪ Cover all exposed skin and be aware of frostbite. While cold air will not freeze the tissues of the lungs, slow down and use a mask or scarf to minimize the effect of cold air on air passages. ▪ Dress in layers with wicking garments (those that carry moisture away from the body – e.g., cotton) and a weatherproof slicker. A wool outer garment is recommended. ▪ Take layers off as you heat up; put them on as you cool down. ▪ Wear head protection that provides adequate insulation and protects the ears. ▪ Maintain your energy level. Avoid exhaustion and over-exertion which causes sweating, dampens clothing, and accelerates loss of body heat and increases the potential for hypothermia. ▪ Acclimate to the cold climate to minimize discomfort. ▪ Maintain adequate water/fluid intake to avoid dehydration.						
	4D) Wind	4D) Effects of the wind ▪ Wind chill greatly affects heat loss (see attached Wind Chill Index). ▪ Avoid marking in old, defective timber, especially hardwoods, during periods of high winds due to snag hazards.						

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	4E) Thunderstorms	4E) Thunderstorms ▪ Monitor weather channels to determine if electrical storms are forced. ▪ Plan ahead and identify safe locations to be in the event of a storm. (e.g., sturdy building, vehicle, etc.) ▪ Suspend all field work at the first sound of thunder. You should be in a safe place when the time between the lightning and thunder is less than 30 seconds. ▪ Only return to work 30 minutes after the after the last strike or sound of thunder



Job Hazard Analysis - HASP Format

Job Title: Swalm Street, North Hempstead; NY Drilling – Pre-ground Clearance Activities **Date of Analysis:** 6/1/2008

Minimum Recommended PPE*: Steel Toed, Slip Resistant Boots; Safety Glasses; Face Shield (if danger to face due to flying particles); Leather and/or Nitrile Gloves, Snake Chaps (if required); High visibility vest; Hard Hat; Hearing Protection; Insulated Gloves (if hand digging to identify underground electrical lines)

*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. All Pre-Ground Disturbance Clearance Activities including Site Inspection, Subsurface Features Mark-out, Removal of Surface Cover and Ground Clearance	1A) Slips/Trips/Falls	1A) Slips/Trips/Falls - Keep work area free of excess material and debris - Remove all trip hazards by keeping materials/objects organized and out of walkways - Keep work surfaces dry when possible - Wear appropriate PPE (see HASP) including non-slip rubber boots if working on wet or slick surfaces - Install rough work surface covers where possible - Stay aware of footing and do not run
	1B) Heat/Cold Stress	1B) Heat/Cold Stress - Take breaks if feeling faint or overexerted - Consume adequate food/beverages (water, sports drinks) - If possible, adjust work schedule to avoid temperature extremes
	1C) Biological Hazards: Insects, Snakes, Wildlife, Vegetation	1C) Biological Hazards: Insects, Snakes, Wildlife, Vegetation - See JHA – Insect Bites and Stings - Inspect work areas when arrive at site to identify hazard(s) - Use insect repellant if observe mosquitoes/gnats - Survey site for presence of biological hazards and maintain safe distance - Wear appropriate PPE including leather gloves, long sleeves and pants, and snake chaps as warranted by site conditions
	1D) Traffic (including pedestrian)	1D) Traffic (including pedestrian) - Notify attendant or site owner/manager of work activities and location - Use cones, signs, flags or other traffic control devices as outlined in the Traffic Control Plan - Set up exclusion zone surrounding work area using cones, signs, flags or other traffic control devices - Wear appropriate PPE including high visibility clothing such as reflective vest - Inspect area behind vehicle prior to backing and use spotter
	1E) Fire/Explosion	1E) Fire/Explosion - Post No Smoking signs around work area - Establish designated smoking area away from work area - Ensure type ABC, 20-lb, fully charged fire extinguisher on-site and within inspection period - As site conditions/activities warrant, establish Hot Work Permit including air monitoring using direct-reading, real-time instruments such as LEL/O meter (see HASP) - Stop work if hazardous conditions (explosive atmosphere) are identified
2. Ambient Air Monitoring	2A) Vapors	2A) Vapors - Approach area where vapors are suspected from upwind direction and stay upwind/crosswind of from potential sources of vapors (use flagging or similar device to indicate wind direction) - See HASP for monitoring requirements and action limits
	2B) Ineffective Air Monitoring	2B) Ineffective Air Monitoring - Ensure personnel using have been trained on instrument use - Calibrate instrument prior to use

Job Hazard Analysis - HASP Format

Job Title: Swalm Street, North Hempstead; NY Drilling – Pre-ground Clearance Activities **Date of Analysis:** 6/1/2008

Key Work Steps	Hazards/Potential Hazards	Safe Practices
3. Breaking-Up and Removing Asphalt/Concrete Cover by Saw Cutting or with Heavy Equipment	3A) Heavy Equipment Movement	3A) Heavy Equipment Movement - Heavy equipment should be equipped with back-up alarm or use horn when backing - Do not allow personnel to stand within the swing radius of equipment booms/arms when equipment is in operation - Stay clear of operating equipment and heavy equipment when moving - When approaching heavy equipment, approach should be made from the front ensuring eye contact is made with operator
	3B) Suspended Loads	3B) Suspended Loads - Do not walk under suspended loads - Wear appropriate PPE including hard hat
	3C) Ignition Sources	3C) Ignition Sources - Ensure electrical equipment properly grounded - Apply water as necessary to address surface sparking potential - Equip heavy equipment with non-sparking bucket/blade
	3D) High Noise Levels	3D) High Noise Levels Hearing protection required when working around operating equipment if levels are suspected to be >85 dBA (if have to yell to person at a dist of 3 ft to be heard, likely exceeding 85 dBA).
	3E) Airborne Particulates and Debris	3E) Airborne Particulates and Debris - Use water as necessary to control dust in area - Wear appropriate PPE including face shield or safety glasses with side shields, dust mask, leather gloves and long sleeves
	3F) Heavy Material Lifting	3F) Heavy Material Lifting - Use heavy equipment to lift - Do not lift or move heavy materials (greater than 50 lbs) without adequate assistance - Bend and lift with legs and arms, keeping back straight - Wear appropriate PPE including leather gloves, long sleeves and pants, and steel-toed boots
	3G) Impact to Subsurface Lines	3G) Impact to Subsurface Lines Ensure all underground features have been identified in area per Subsurface Clearance Protocol (SCP) prior to start of activities
	3H) Equipment Rollover	3H) Equipment Rollover If soil appears unstable, the soil should be assessed by a qualified professional engineer to ensure safe conditions with implementation of design control measures prior to start of work
	3I) Heavy Equipment Movement	3I) Heavy Equipment Movement - Heavy equipment should be equipped with back-up alarm - When approaching heavy equipment, approach should be made from the front ensuring eye contact is made with operator
	3J) Physical Injury from Managing Equipment	3J) Physical Injury from Managing Equipment Take breaks if feeling faint or overexerted
	3K) Ignition Sources	3K) Ignition Sources - Ensure equipment properly bonded and grounded - Use sufficient hose so that equipment does not have to be located in critical zone - Apply water as necessary to address sparking potential if equipment comes in contact with rocks/buried objects - Equip heavy equipment with non-sparking bucket/blade

Job Hazard Analysis - HASP Format

Job Title: Swalm Street, North Hempstead; NY Drilling – Pre-ground Clearance Activities **Date of Analysis:** 6/1/2008

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3L) High Noise Levels	3L) High Noise Levels Hearing protection required when working around operating equipment if levels are suspected to be >85 dBA (if have to yell to person at a dist of 3 ft to be heard, likely exceeding 85 dBA).
	3M) Airborne Debris	3M) Airborne Debris Wear appropriate PPE including leather gloves, long sleeves and pants, and face shield or safety glasses with side shields (see HASP)
	3N) Vapors and Airborne Particulates	3N) Vapors and Airborne Particulates - Monitor air concentrations using direct-reading, real-time instruments such as OVM and Dräger tubes (See HASP for monitoring equipment and action limits) - Stop work if hazardous conditions (explosive atmosphere, O2 deficient atmosphere) identified until precautions are taken (See HASP) - Wear appropriate PPE including dust masks and respirators (See HASP) - Stay upwind (use flagging or similar device to indicate wind direction)
	3O) Impact to Underground Lines/Tanks	3O) Impact to Underground Lines/Tanks - Ensure underground features in area have been identified to extent possible per SCP (line locators, drawing review,) - Wear insulating gloves or stand on insulating mat when advancing hand tools
	3P) Open Excavation	3P) Open Excavation - Personnel should stay at least two feet away from edge - Install orange construction fence or temporary chain link fence around excavated area if to be left unattended
4. Solid Waste Management/Disposal	4A) Vapors and Airborne Particulates	4A) Vapors and Airborne Particulates - Monitor air concentrations using direct-reading, real-time instruments such as OVM and Dräger tubes (See HASP for required monitoring instruments and action limits) - Stop work if hazardous conditions (explosive atmosphere, O2 deficient atmosphere) identified until precautions are taken (See HASP) - Wear appropriate PPE including safety glasses with side shields, dust masks and respirators (See HASP) - Stay upwind (use flagging or similar device to indicate wind direction)
	4B) Contaminated Materials and Container Pinch Points	4B) Contaminated Materials and Container Pinch Points - Wear appropriate PPE including nitrile and leather gloves (See HASP) - Position hands/fingers to avoid pinching/smashing/crushing when closing drum rings
	4C) Heavy Materials and Container Lifting/Moving	4C) Heavy Materials and Container Lifting/Moving - Do not lift or move heavy containers without assistance - Use proper bending/lifting techniques by lifting with arms and legs and not with back - If possible, use powered lift truck, drum cart, or other mechanical means to move containers - Take breaks if feeling faint or overexerted - Spot drums in storage area prior to filling - Wear appropriate PPE including leather gloves and steel-toed boots (See HASP)

Job Hazard Analysis Form

JHA No.: JHA - _____

Job Title: Decontamination

Date of Analysis: 5/1/07

Job Location: 118-130 Swalm Street, North Hempstead, NY **Team Leader:** Jayme Connolly

Applicable ES&H Procedures: 2.9.A - Hazardous Waste Operations and Emergency Response Program
 2.9.C - Respiratory Protection Program
 2.9.D - Personal Protective Equipment Program
 2.9.E - Hazard Communication Program
 2.5.1 - Heavy Equipment
 2.9.16 - Thermal Stress
 2.9.21 - Power and Hand Tools

Other Referenced JHAs:

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Establish Decontamination Station	1A) Materials Handling	1A) Materials Handling - Use proper lifting techniques - Use mechanical aids, if available, to move heavy items.
2. Decontamination / Steam cleaning.	2A) Struck by steam/hot water/pressure washing	2A) Struck by steam/hot water - Workers not directly engaged in steam cleaning operations must stay clear. - Workers using steam cleaning equipment must be trained on operation and safety devices/procedures using the owners/operators manual. - Use face shield and safety glasses or goggles, if steam cleaning. - Stay out of the splash/steam radius. - Pressure washer must have dead man switch. - Do not direct steam at anyone. - Do not hold objects with your feet or hands. - Ensure that direction of spray minimizes spread of contaminants of concern. - Use shielding as necessary.
	2B) Exposure to contaminants	2B) Exposure to contaminants - Conduct air monitoring (see HASP). - Wear proper PPE. - See MSDSs for hazards associated with the decon solutions used (if other than water alone is used).
	2C) Slips/Trips/Falls	2C) Slips/Trips/Falls - Be cautious as ground/plastic can become slippery - Use boots or boot covers with good traction
3. Vehicle Decontamination	3A) Vehicle traffic in and out of the CRZ	3A) Large Vehicle Traffic - Always wear a hard hat, steel toe boots, and a high visibility vest (unless Tyveks are used and are high visibility). - Vehicle drivers are not to exit the vehicle in the CRZ. - Identify an individual to communicate with vehicle drivers and maintain order - Trucks will be lined with plastic and kept out of direct contact with any contaminated materials during loading. Wear PPE when removing plastic lining from truck beds. - If not in the vehicle, obtain eye contact with the driver, so he is aware of your presence and location in the CRZ.

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Owner: H.J. Gordon Approver: S. D. Rima PAGE 2 OF 2

Key Work Steps	Hazards/Potential Hazards	Safe Practices
		If you are driving the vehicle, be aware of personnel in the CRZ and maintain communication with the identified personnel.
	3B) Exposure to contaminants	3B) Exposure to contaminants - Use safety glasses or goggles, Polycoated Tyvek (if level of contamination poses dermal hazard or to keep work clothes dry), high visibility vest (if high visibility Tyveks are not used) hard hats, steel toe boots, and gloves while cleaning contaminated materials. - Do not doff PPE until decontamination of the vehicle is complete and a decontamination certificate has been issued by the HSO. - Conduct air monitoring (see HASP). - See MSDSs for hazards associated with the decon solutions (if other than water alone is used).
	3C) Slips/Trips/Falls	3C) Slips/Trips/Falls - Be cautious as ground/plastic can become slippery - Use boots or boot covers with good traction
4. Equipment and Sample Decontamination	4A) Chemical exposure when handling contaminated sample jars and equipment	4A) Chemical exposure - Wear PPE. - Refer to MSDS for specific hazards associated with decon solutions - Monitor breathing zone for contaminants - Monitor breathing zone for decon solutions (e.g., methanol, hexane, etc.) if appropriate (see HASP)
	4B) Materials Handling related injuries	4B) Materials Handling related injuries - Use proper lifting techniques when lifting heavy equipment - Use two person lift for heavy coolers
5. Personal Decontamination	5A) Exposure to contaminants	5A) Exposure to contaminants - Avoid bringing contaminated materials via shoes and clothing into the CRZ by examining such prior to exiting the EZ. - Removal of PPE will be performed by the following tasks in the listed order: - Gross boot wash and rinse and removal - Outer glove removal - Suit removal - Respirator removal (if worn). - Inner glove removal - Contaminated PPE is to be placed in the appropriate, provided receptacles. - Respirators will be removed and decontaminated at a specified location within the CRZ by a designated technician, then placed in storage bag. - Employees will wash hands, face, and any other exposed areas with soap and water. - Portable eyewash stations and showers will be available should employees come into direct contact with contaminated materials. - See MSDSs for hazards associated with the decontamination solutions used. - Decon solutions will be disposed of according to the work plan.

Job Safety Analysis Training Guide	Job Title: WWT Operator		October 17, 2006
Department: WWT	Section: 2.0 Groundwater level monitoring/ Troll Data	Supervisor: R. O'Brien	Analysis by: J. Caryl, R. O'Brien
			Reviewed by:
Required and / or recommended Personal Protective Equipment: Level D PPE			Approved by:
Sequence of basic job steps		Potential accidents or hazards	Recommended safe job procedure
Locate well to be monitored (1-33)		Slip / trips / falls	Be aware of surroundings
Remove well cover bolts from well being monitored		Wrench slips off of bolt heads	Be sure that both the wrench and bolts are in good condition
Remove well cover		Pinch point	Wear canvas gloves to protect hands
Remove well cap		Pinch point	Wear canvas gloves; hold onto well cap securely to avoid hand slipping off of cap.
Insert gauge		Back strain	Bend with knees
Observe gauge depth at side of well casing		Back strain	Bend with knees
Remove gauge			
Clean gauge with alcohol and rinse with distilled water as outlined in SOP		Rubbing alcohol drying out skin on hands.	Wear nitrile protective gloves when cleaning gauge
Replace well cap		Pinch point	Wear canvas gloves; hold onto well cap securely to avoid hand slipping off of cap.
Replace well cover		Pinch point	Wear canvas gloves to protect hands
Replace well cover bolts		Wrench slips off of bolt heads	Be sure that both the wrench and bolts are in good condition

Job Hazard Analysis Form

JHA No.: JHA - _____ - _____ - _____ - _____

Job Title: Groundwater Sampling

Date of Analysis: 8/20/07

Job Location: 118-130 Swalm Street, North Hempstead, NY Team Leader/Project Manager: Jayme Connolly

Applicable ES&H Procedures:

- 2.9.A - Hazardous Waste Operations and Emergency Response Program
- 2.9.C - Respiratory Protection Program
- 2.9.D - Personal Protective Equipment Program
- 2.9.19 - Electrical Safety
- 2.14.1 - Flammable and Combustible Liquids
- 2.14.5 - Collection of Field Samples

Other Referenced JHAs:

- Mobilization/Demobilization and Site Preparation
- Field Work General
- Insect Stings and Bites
- Gasoline
- Working with Preservatives

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Mobilization	1A) See JHA Mobilization/Demobilization/Site Preparation	1A) See JHA Mobilization/Demobilization/Site Preparation
2. General Site Hazards	2A) See JHA Field Work - General	2A) See JHA Field Work - General
	2B) Chemical exposure	2B) Chemical Exposure Read HASP and determine air monitoring and PPE needs.
3. Calibrate monitoring equipment	3A) Exposure to calibration gases	3A) Exposure to calibration gases - Review equipment manuals - Calibrate in a clean, well ventilated area
4. Opening the well cap, taking water level readings	4A) Contact with poisonous plants or the oil from poisonous plants	4A) Contact with poisonous plants or the oil from those plants: - Look for signs of poisonous plants and avoid. - Ensure all field workers can identify the plants. Mark identified poisonous plants with spray paint if working at a fixed location. - Wear PPE as described in the HASP. - Do not touch any part of your body/clothing. - Always wash gloves before removing them. - Discard PPE in accordance with the HASP. - Use commercially available products such as Ivy Block or Ivy Wash as appropriate.

Issued: 1/23/06 Effective: 1/24/06 ESH-2.9.1 REVISION 2

Owner: H.J. Gordon Approver: S. D. Rima PAGE 2 OF 3

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	4B) Contact with biting insects (i.e., spiders, bees, etc.) which may have constructed a nest in the well cap/well.	4B) Contact with stinging/biting insects - Discuss the types of insects expected at the Site and be able to identify them. - Look for signs of insects in and around the well. - Wear Level of PPE as described in the HASP. At a minimum, follow guidelines in the JHA "Insects Stings and Bites." - If necessary, wear protective netting over your head/face. - Avoid contact with the insects if possible. - Inform your supervisor and the Site Health and Safety Supervisor if you have any allergies to insects and insect bites. Make sure you have identification of your allergies with you at all times and appropriate response kits if applicable. - Get medical help immediately if you are bitten by a black widow or brown recluse, or if you have a severe reaction to any spider bite or bee sting.
	4C) Exposure to hazardous Inhalation and contact with hazardous substances (VOC contaminated groundwater/soil); liquid splash; flammable atmospheres.	4C) Exposure to hazardous substances - Wear PPE as identified in HASP. - Review hazardous properties of site contaminants with workers before sampling operations begin - Immediately monitor breathing zone after opening well to determine exposure and verify that level of PPE is adequate – see Action Levels in HASP - Monitor headspace in well. After the initial headspace reading (if required by the Work Plan), allow the well to vent for several minutes before obtaining water level and before sampling. - When decontaminating equipment wear additional eye/face protection over the safety glasses such as a face shield.
	4D) Back strain due to lifting bailers or pumps and from moving equipment to well locations	4D) Back strain - Use mechanical aids when possible, if mechanical aids are not available, use two person lifts for heavy items. - Use proper lifting techniques
	4E) Foot injuries from dropped equipment	4E) Foot Injuries - Be aware when moving objects, ensure you have a good grip when lifting and carrying objects. - Do not carry more than you can handle safely - Wear Steel toed boots
5. Collecting water samples	5A) Fire/Explosion/Contamination hazard from refueling generators	5A) Fire/Explosion/Contamination hazard from refueling generators - Turn the generator off and let it cool down before refueling - Segregate fuel and other hydrocarbons from samples to minimize contamination potential - Transport fuels in approved safety containers. The use of containers other than those specifically designed to carry fuel is prohibited - See JHA for Gasoline use

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 Owner: H.J. Gordon Approver: S. D. Rima PAGE 3 OF 3

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	5B) Electrocution	5B) Electrocution - A ground fault circuit interrupter (GFCI) device must protect all AC electrical circuits. - Use only correctly grounded equipment. Never use three-pronged cords which have had the third prong broken off. - Make sure that the electrical cords from generators and power tools are not allowed to be in contact with water - Do not stand in wet areas while operating power equipment - Always make sure all electrically-powered sampling equipment is in good repair. Report any problems so the equipment can be repaired or replaced. - When unplugging a cord, pull on the plug rather than the cord. - Never do repairs on electrical equipment unless you are both authorized and qualified to do so.
	5C) Exposure to contaminants	5C) Exposure to Contaminants - Stand up wind when sampling - Monitor breathing zone with appropriate monitoring equipment (see HASP) - Wear chemical resistant PPE as identified in HASP - See section 4C) under Safe Practices above
	5D) Infectious water born diseases	5D) Infectious water born diseases - Wear chemical resistant gloves and other PPE – as identified in HASP - Prevent water from contacting skin - Wash exposed skin with soap and water ASAP after sampling event - Ensure that all equipment is adequately decontaminated using a 10% bleach solution
	5E) Exposure to water preservatives	5E) Exposure to water preservatives - Work in a well ventilated area, upwind of samples - Wear chemical resistant PPE as identified in HASP - When preserving samples always add acid to water, avoid the opposite. - See JHA Working with Preservatives



Job Hazard Analysis - HASP Format

Job Title: Environmental Drilling/Boring and Associated Soil Sampling

Date of Analysis: 6/1/2008

Minimum Recommended PPE*: Steel Toed, Slip Resistant Boots; Safety Glasses; Face Shield (if danger to face due to flying particles); Leather and/or Nitrile Gloves, Snake Chaps (if required); High visibility vest; Hard Hat; Hearing Protection; Insulated Gloves (if hand digging to identify underground electrical lines)

*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. All Drilling/Boring Activities	2A) Slips, Trips, Falls	1A) Slips, Trips, Falls - Keep work area free of excess material and debris - Remove all trip hazards by keeping materials/objects organized and out of walkways - Keep work surfaces dry when possible - Wear appropriate PPE (See HASP) including non-slip rubber boots if working on wet or slick surfaces - Install rough work surface covers where possible - Stay aware of footing and do not run
	2B) Heat/Cold Stress	1B) Heat/Cold Stress - Take breaks if feeling faint or overexerted - Consume adequate food/beverages (water, sports drinks) - If possible, adjust work schedule to avoid temperature extremes
	2C) Biological Hazards: Insects, Snakes, Wildlife, Vegetation	1C) Biological Hazards: Insects, Snakes, Wildlife, Vegetation - Inspect work areas when arrive at site to identify hazard(s) - Use insect repellant if observe mosquitoes/gnats - Open enclosures slowly - Survey site for presence of biological hazards and maintain safe distance - Wear appropriate PPE including leather gloves, long sleeves and pants, and snake chaps as warranted by site conditions (See HASP)
	2D) Traffic (including pedestrian)	1D) Traffic (including pedestrian) - Notify attendant or site owner/manager of work activities and location - Use cones, signs, flags or other traffic control devices as outlined in the Traffic Control Plan - Set up exclusion zone surrounding work area using cones, signs, flags or other traffic control devices - Wear appropriate PPE including high visibility clothing such as reflective vest (See HASP) - Inspect area behind vehicle prior to backing and use spotter
	2E) Fire/ Explosion	1E) Fire/ Explosion - Post No Smoking signs around work area - Establish designated smoking area away from work area - Ensure type ABC, 20-lb, fully charged fire extinguisher on-site and within inspection period - As site conditions/activities warrant, establish Hot Work Permit including air monitoring using direct-reading, real-time instruments such as LEL/O₂ meter (See HASP for required monitoring instruments and action limits) - Stop work if hazardous conditions (explosive atmosphere) are identified
2. Ambient Air Monitoring	2A) Vapors	2A) Vapors Approach area where vapors are suspected from upwind direction and stay upwind/crosswind of from potential sources of vapors (use flagging or similar device to indicate wind direction)
	2B) Ineffective Air Monitoring	2B) Ineffective Air Monitoring - Ensure personnel using have been trained on instrument use - Calibrate instrument prior to use



Job Hazard Analysis - HASP Format

Job Title: Environmental Drilling/Boring and Associated Soil Sampling

Date of Analysis: 6/1/2008

Key Work Steps	Hazards/Potential Hazards	Safe Practices
3. Concrete Coring	3A) Ignition Sources	3A) Ignition Sources - Ensure electrical equipment properly grounded - Apply water as necessary to address surface sparking potential
	3B) High Noise Levels	3B) High Noise Levels Hearing protection required when working around operating equipment if levels are suspected to be >85 dBA (if have to yell to person at a dist of 3 ft to be heard, likely exceeding 85 dBA).
	3C) Airborne Particulates and Debris	3C) Airborne Particulates and Debris - Use water as necessary to control dust in area - Wear appropriate PPE including face shield or safety glasses with side shields, dust mask, leather gloves and long sleeves (See HASP)
	3D) Sharp Rough Materials	3D) Sharp Rough Materials Wear appropriate PPE including leather gloves, long sleeves and pants, and steel-toed boots (See HASP)
	3E) Impact to Subsurface Lines	3E) Impact to Subsurface Lines Ensure all underground features have been identified in area per SCP prior to start of activities
4. Drill Rig Set-Up	4A) Contact with Electric Lines and Other Overhead Obstacles	4A) Contact with Electric Lines and Other Overhead Obstacles - Position rig to avoid overhead utility lines by distance defined by voltage and local regulations - Use a spotter when raising mast to confirm clearance of overhead lines and other obstructions
	4B) Rig Movement	4B) Rig Movement - Heavy equipment should be equipped with back-up alarm or use horn when backing - use spotter when available - Stay clear of operating equipment and rig when moving
	4C) Heavy Equipment Lifting/ Carrying	4C) Heavy Equipment Lifting/ Carrying Use at least 2 people to lift and carry sections, use mechanical lift devices whenever possible, bend and lift with legs and arms, not back
	4D) Sharp or Elevated Equipment	4D) Sharp or Elevated Equipment - Wear appropriate PPE including steel-toed safety boots, leather gloves and hard hat (See HASP) - Establish communication system between workers involved in moving/attaching sections
5. Ground Disturbance: Auger/Boring Advancement	5A) Faulty or Inappropriate Equipment	5A) Faulty or Inappropriate Equipment - Qualified driller must inspect drill rig prior to use, if faulty or inappropriate, do not proceed until repaired or replaced - Inspect all hand tools prior to use, if faulty or inappropriate, do not proceed until repaired or replaced. Tag out all defective tools
	5B) Moving Equipment	5B) Moving Equipment - Clear area of obstructions and communicate with all workers involved that drilling is beginning - Do not exceed manufacturer's recommended speed, force, torque, or other specifications. and penetrate the ground slowly with hands on the controls for at least the first foot of soil to minimize chance of auger kick-out - Stay clear of rotating auger - Use long-handled shovel to clear away cuttings when auger has stopped - Do not wear loose clothing - Wear appropriate PPE including leather gloves and steel-toed boots (See HASP)



Job Hazard Analysis - HASP Format

Job Title: Environmental Drilling/Boring and Associated Soil Sampling

Date of Analysis: 6/1/2008

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	5C) Suspended Loads	5C) Suspended Loads - Do not walk under suspended loads - When possible, remove overhead hazards promptly - Wear appropriate PPE including hard hat and steel-toed boots (See HASP)
	5D) High Noise Levels	5D) High Noise Levels Use hearing protection if within 20 feet of active drill rig
	5E) Ground Disturbance: Auger/Boring Advancement Vapors and Airborne	5E) Ground Disturbance: Auger/Boring Advancement Vapors and Airborne Monitor air concentrations using direct-reading, real-time instruments such as OVM and Dräger tubes (See HASP for required monitoring instruments and action limits)
	5F) Particulates	5F) Particulates - Stop work if hazardous conditions (explosive atmosphere, O₂ deficient atmosphere) identified until precautions are taken (See HASP for required monitoring instruments and action limits) - Wear appropriate PPE including face shield or safety glasses with side shields, dust masks or respirators, long sleeves and pants (See HASP) - Stay upwind (use flagging or similar device to indicate wind direction)
	5G) Impact to Subsurface Lines/Tanks	5G) Impact to Subsurface Lines/Tanks - Only drill in areas where underground features have been identified and cleared per Subsurface Clearance Protocol (SCP) if hole has to be moved, clear new location first - Wear appropriate PPE including insulating gloves or stand on an insulating mat when in contact with drill rig - Ensure first aid responders are trained to deal with electric shock and flash burns
6. Ground Intrusion: Split Spoon	6A) Faulty Equipment	6A) Faulty Equipment - Inspect rope/cable/rod for wear, fraying, oils and moisture prior to use, do not use if faulty until repaired or replaced. - Inspect cathead for rust and rope grooves prior to use, do not use if faulty until repaired or replaced - Report any defects to your supervisor
	6B) Moving Equipment	6B) Moving Equipment - Do not wrap rope around any part of the hand or body - Maintain distance of at least 18-inches from in-running points on running/reciprocating equipment - Eliminate excess rope - Do not wear loose clothing - Wear appropriate PPE including leather gloves (See HASP)
7. Soil Sampling	6C) Contaminated Materials	6C) Contaminated Materials Wear appropriate PPE including Nitrile gloves (See HASP)
	6D) Sharp Sampling Tools	6D) Sharp Sampling Tools - Use correct tools for opening sleeves - When opening sleeve, cut away from body - Place soil core on sturdy surface prior to cutting
	6E) Vapors	6E) Vapors Wear appropriate PPE including respirator if conditions warrant
	6F) Sample Cross Contamination	6F) Sample Cross Contamination - Decontaminate or dispose of sampling equipment between sampling locations - Double-check sample labels to ensure accuracy and adhesion to containers



Job Hazard Analysis - HASP Format

Job Title: Environmental Drilling/Boring and Associated Soil Sampling

Date of Analysis: 6/1/2008

Key Work Steps	Hazards/Potential Hazards	Safe Practices
8. Solid/Liquid Waste Management/ Disposal	6G) Vapors and Airborne Particulates	6G) Vapors and Airborne Particulates ▪ Monitor air concentrations using direct-reading, real-time instruments such as OVM and Dräger tubes (See HASP for required monitoring instruments and action limits) ▪ Stop work if hazardous conditions (explosive atmosphere, O2 deficient atmosphere) identified until precautions are taken ▪ Wear appropriate PPE including safety glasses with side shields, dust masks and respirators (See HASP) ▪ Stay upwind (use flagging or similar device to indicate wind direction)
	6H) Contaminated Materials and Container Pinch Points	6H) Contaminated Materials and Container Pinch Points ▪ Wear appropriate PPE including Nitrile and leather gloves (See HASP) ▪ Position hands/fingers to avoid pinching/smashing/crushing when closing drum rings
	6I) Heavy Materials and Containers Lifting/ Moving	6I) Heavy Materials and Containers Lifting/ Moving ▪ Do not lift or move heavy containers without assistance ▪ Use proper bending/lifting techniques by lifting with arms and legs and not with back ▪ If possible, use powered lift truck, drum cart, or other mechanical means Take breaks if feeling faint or overexerted ▪ Spot drums in storage area prior to filling ▪ Wear appropriate PPE including leather gloves and steel-toed boots



Job Hazard Analysis - HASP Format

Job Title: Handling Compressed Gas Cylinders

Date of Analysis: 9/14/06

Minimum Recommended PPE*: Steel toed boots

*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Moving full gas cylinder to work area or to vehicle.	1A) Projectile hazard (if cylinder falls and neck shears off)	1A) Projectile Hazard - Use cylinder cart to transport gas cylinders. - Cylinders are to be secured to the cart - Move gas cylinders only with the protective cap in place. - Move gas cylinders in an upright position - Do not allow cylinders to drop or strike against each other or against hard objects.
	1B) Back or muscle strain	1B) Back or muscle strain - Avoid lifting cylinder. - Use materials handling aid (e.g., cart, dolly, etc.) whenever possible - If cylinder must be lifted, use proper lifting techniques (lift with legs, not back, don't reach or use a twisting motion). - Obtain assistance in lifting large cylinders
	1C) Foot injury	1C) Foot injury Wear steel toed boots
2. Transporting a gas cylinder in a vehicle.	2A) Asphyxiation and/or chemical exposure	2A) Asphyxiation and/or chemical exposure - All gases can create an asphyxiation hazard. Some may also be toxic and/or flammable - Ensure cylinder is NOT leaking (use soapy water to check), valve is tightly closed, regulator removed and cap is secured to cylinder. - Gas cylinders should NOT be transported in the passenger compartment of a vehicle. Cylinders should be transported in a pickup bed, or trailer. - Do not transport with incompatibles
	2B) Fire hazard	2B) Fire hazard - Do not leave cylinders in vehicles – especially in extreme temperatures. - Secure in vehicles – away from flammable/combustible materials and ignition sources. - Ensure cylinder is NOT leaking (use soapy water to check), valve is tightly closed, regulator removed and cap is secured to cylinder.
	2C) Projectile hazard	2C) Projectile hazard - Secure cylinders tightly to vehicle. - Do not allow cylinders to roll around loosely in vehicle
3. Securing a gas cylinder in the field	3A) Back or muscle strain.	3A) Back or muscle strain. - Use mechanical aid (e.g., cart) to move large cylinder, if possible. - If lifting and manual handling is unavoidable, use proper lifting techniques. Protect your back from strain and twisting. - Use two people to handle large cylinders
	3B) Projectile hazard	3B) Projectile hazard - Ensure tanks are secured tightly to wall of trailer, to a cart, or to a tree, post or other sturdy object, in an upright position. - Do not lay cylinder on it's side.
	3C) Fire hazard	3C) Fire hazard - Store flammable gases away from combustible materials (wood, paper, dried grasses, etc.) - Store away from ignition sources

Job Hazard Analysis - HASP Format

Job Title: Handling Compressed Gas Cylinders

Date of Analysis: 9/14/06

	3D) Chemical exposure	3D) Chemical exposure ▪ Ensure label on cylinder is legible ▪ Ensure valves are tightly closed when not in use ▪ Store away from incompatibles ▪ Review MSDS ▪ Wear PPE as identified in HASP.
4. Using gas cylinders	4A) Projectile hazard.	4A) Projectile hazard ▪ Ensure cylinder is secured tightly before removing protective cap.
	4B) Cylinder may fall when changing cylinders.	4B) Cylinder may fall when changing cylinders. ▪ Ensure BOTH cylinders are secured tightly to the wall or the transport cart.
	4C) Leaking Cylinders	4C) Leaking Cylinders ▪ Move all leaking cylinders outdoors, into a well ventilated area
	4D) High pressure gas release	4D) High pressure gas release ▪ Use proper procedures to open and close a cylinder with a regulator attached: ▪ Open cylinder valves slowly and do not open valves all the way. ▪ Open so nozzle is facing away from person ▪ Open valves only by hand unless the cylinder is specifically designed to be opened with a hand tool (keep hand tool with cylinder)
5. Returning "empty" gas cylinder to vendor	5A) High pressure gas	5A) High pressure gas ▪ Replace protective cap on the empty gas cylinder before transporting to vendor.
	5B) Moving a heavy object	5B) Moving a heavy object ▪ Use proper lifting techniques. Protect your back from strain and twisting. ▪ Get aid when lifting heavy cylinders ▪ Use a cart, if possible, to transport cylinders

Job Hazard Analysis - HASP Format

Job Title: Well Development

Date of Analysis: 8/11/06

Minimum Recommended PPE*:

*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Going to site, work preparation	1A) Mobilization / Demobilization and Site Preparation	1A) See JHA for Mobilization Demobilization and Site Preparation ▪ See HASP for required PPE and air monitoring equipment needs
2. Working at the site	2A) General Field Work – Walking and working in the field, environmental conditions, communication	2A) See JHA for General Field Work
3. Surge and Bail well	3A) Lifting/Twisting/Tugging	3A) Lifting/Twisting/Tugging ▪ Use proper lifting techniques when lifting equipment ▪ Use mechanical aids if available ▪ Use 2 person lift for heavy items
	3B) Slips/Trips/Falls	3B) Slips/Trips/Falls ▪ Ground can become wet/muddy, created by spilled water ▪ Place all purged water in drums or carboys for removal ▪ Wear good slip resistant footwear
	3C) Entanglement – Mechanical Surge	3C) Entanglement – Mechanical Surge ▪ Be aware of cords/wiring/hose location at all times. ▪ Secure all loose clothing and long hair
	3D) Exposure to Contaminated Groundwater	3D) Exposure to Contaminated Groundwater ▪ After the initial headspace reading (if required by the Work Plan), allow the well to vent for several minutes before bailing well ▪ Wear PPE as identified in HASP. ▪ Review hazardous properties of site contaminants with workers before sampling operations begin ▪ Monitor breathing zone air in accordance with HASP to determine levels of contaminants present. ▪ Wear face shield if splash hazard exists.
	3E) Poisonous Plants and Insects	3E) Poisonous Plants and Insects ▪ Look for signs of poisonous plants and avoid. ▪ Ensure all field workers can identify the plants. Mark identified poisonous plants with spray paint if working at a fixed location. ▪ Wear PPE as described in the HASP. ▪ Do not touch any part of your body/clothing. ▪ Always wash gloves before removing them. ▪ Discard PPE in accordance with the HASP. ▪ Use commercially available products such as Ivy Block or Ivy Wash as appropriate.
	3F) Contact with biting insects (i.e., spiders, bees, etc.) which may have constructed a nest in the well cap/well.	3F) Contact with biting insects ▪ Discuss the types of insects expected at the Site and be able to identify them. ▪ Look for signs of insects in and around the well. ▪ Wear Level of PPE as described in the HASP. At a minimum, follow guidelines in the JHA "Insects Stings and Bites." ▪ If necessary, wear protective netting over your head/face. ▪ Avoid contact with the insects if possible. ▪ Inform your supervisor and the Site Health and Safety Supervisor if you have any allergies to insects and insect bites. Make sure you have identification of your allergies with you at all times and appropriate response kits if applicable. ▪ Get medical help immediately if you are bitten by a black widow or brown recluse, or if you have a severe reaction to any spider bite or bee sting.



Job Hazard Analysis - HASP Format

Job Title: Well Development

Date of Analysis: 8/11/06

Key Work Steps	Hazards/Potential Hazards	Safe Practices
4. Pump well	4A) Lifting/Twisting/Tugging	4A) Lifting/Twisting/Tugging ▪ Use proper lifting techniques when lifting equipment ▪ Use mechanical aids if available ▪ Use 2 person lift for heavy items
	4B) Using Generator/Electrical Equipment	4B) Using Generator/Electrical Equipment ▪ A ground fault circuit interrupter (GFCI) device must protect all AC electrical circuits. ▪ Use only correctly grounded equipment. Never use three-pronged cords which have had the third prong broken off. ▪ Make sure that the electrical cords from generators and power tools are not allowed to be in contact with water ▪ Do not stand in wet areas while operating power equipment ▪ Always make sure all electrically-powered equipment is in good repair. Report any problems so the equipment can be repaired or replaced. ▪ When unplugging a cord, pull on the plug rather than the cord. ▪ Never do repairs on electrical equipment unless you are both authorized and qualified to do so.
	4C) Entanglement	4C) Entanglement ▪ Be aware of cords/wiring/hose location at all times. ▪ Secure all loose clothing and long hair
	4D) Exposure to Contaminated Groundwater	4D) Exposure to Contaminated Groundwater ▪ After the initial headspace reading (if required by the Work Plan), allow the well to vent for several minutes before bailing well ▪ Wear PPE as identified in HASP. ▪ Review hazardous properties of site contaminants with workers before sampling operations begin ▪ Monitor breathing zone air in accordance with HASP to determine levels of contaminants present. ▪ Wear face shield if splash hazard exists.
	4E) Cuts to hands	4E) Cuts ▪ Be alert for sharp edges. Wear cut resistant gloves as appropriate
	4F) Poisonous Plants and Insects	4F) Poisonous Plants and Insects ▪ Look for signs of poisonous plants and avoid. ▪ Ensure all field workers can identify the plants. Mark identified poisonous plants with spray paint if working at a fixed location. ▪ Wear PPE as described in the HASP. ▪ Do not touch any part of your body/clothing. ▪ Always wash gloves before removing them. ▪ Discard PPE in accordance with the HASP. ▪ Use commercially available products such as Ivy Block or Ivy Wash as appropriate.

Job Hazard Analysis - HASP Format

Job Title: Well Development

Date of Analysis: 8/11/06

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	4G) Contact with biting insects (i.e., spiders, bees, etc.) which may have constructed a nest in the well cap/well.	4G) Contact with biting insects ▪ Discuss the types of insects expected at the Site and be able to identify them. ▪ Look for signs of insects in and around the well. ▪ Wear Level of PPE as described in the HASP. At a minimum, follow guidelines in the JHA "Insects Stings and Bites." ▪ If necessary, wear protective netting over your head/face. ▪ Avoid contact with the insects if possible. ▪ Inform your supervisor and the Site Health and Safety Supervisor if you have any allergies to insects and insect bites. Make sure you have identification of your allergies with you at all times and appropriate response kits if applicable. ▪ Get medical help immediately if you are bitten by a black widow or brown recluse, or if you have a severe reaction to any spider bite or bee sting.
5. Dispose of developmental water	5A) Lifting, Carrying (5 gal carboys or heavy equipment)	5A) Lifting, Carrying ▪ Use proper lifting techniques when lifting equipment ▪ Use mechanical aids if available ▪ Use 2 person lift for heavy items
	5B) Slips/Trips/Falls	5B) Slips/Trips/Falls ▪ Ground can become wet/muddy, created by spilled water ▪ Place all purged water in drums or carboys for removal ▪ Wear good slip resistant footwear
	5C) Exposure to Contaminated Groundwater	5C) Exposure to Contaminated Groundwater ▪ After the initial headspace reading (if required by the Work Plan), allow the well to vent for several minutes before bailing well ▪ Wear PPE as identified in HASP. ▪ Review hazardous properties of site contaminants with workers before sampling operations begin ▪ Monitor breathing zone air in accordance with HASP to determine levels of contaminants present. ▪ Wear face shield if splash hazard exists.
	5D) Walking through woods	5D) Walking through woods ▪ Protect head against falling objects. ▪ Wear your hardhat for protection from falling limbs and pinecones, and from tools and equipment carried by other crewmembers. ▪ Stay out of the woods during extremely high winds. ▪ Watch your footing as stepping over rocks, roots, uneven terrain, etc.