JOHNSON & HOFFMAN MANUFACTURING CORP.

NASSAU COUNTY

CARLE PLACE, NEW YORK

SITE MANAGEMENT PLAN

NYSDEC Site Number: V-00684

Prepared for:

Manley Holdings, Inc.

CAWSL Enterprises, Inc.

Ansaco Properties One LLC

Prepared by:

ERM Consulting & Engineering, Inc.

105 Maxess Road, Suite 316

Melville, New York 11747
631-756-8900

Revisions to Final Approved Site Management Plan:

Revision No.	Date Submitted	Summary of Revision	NYSDEC Approval Date

FEBRUARY 2018

CERTIFICATION STATEMENT

I STEPHEN A. MIRABELLO certify that I am currently a NYS registered professional engineer as in defined in 6 NYCRR Part 375 and that this Site Management Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10).

089550 P.E

2-16-2018 DATE

TABLE OF CONTENTS

JOHNSON & HOFFMAN MANUFACTURING SITE
NASSAU COUNTY
CARLE PLACE, NEW YORK

SITE MANAGEMENT PLAN

Table of Contents

TABLE OF CONTENTS (Continued)

TABLE OF CONTENTS (Continued)

List of Tables

TABLE OF CONTENTS (Continued)

Section Description Page

List of Figures

List of Appendices

List of Acronyms

AS	Air Sparging
ASP	Analytical Services Protocol
BCA	Brownfield Cleanup Agreement
BCP	Brownfield Cleanup Program
CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CAMP	Community Air Monitoring Plan
C/D	Construction and Demolition
CFR	Code of Federal Regulation
CLP	Contract Laboratory Program
COC	Certificate of Completion
CO2	Carbon Dioxide
CP	Commissioner Policy
DER	Division of Environmental Remediation
EC	Engineering Control
ECL	Environmental Conservation Law
ELAP	Environmental Laboratory Approval Program
ERP	Environmental Restoration Program
EWP	Excavation Work Plan
GHG	Green House Gas
GWE&T	Groundwater Extraction and Treatment
HASP	Health and Safety Plan
IC	Institutional Control
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCRR	New York Codes, Rules and Regulations
O&M	Operation and Maintenance
OM&M	Operation, Maintenance and Monitoring
OSHA	Occupational Safety and Health Administration
OU	Operable Unit
PID	Photoionization Detector
PRP	Potentially Responsible Party
PRR	Periodic Review Report
QA/QC	Quality Assurance/Quality Control
QAPP	Quality Assurance Project Plan
RAO	Remedial Action Objective
RAWP	Remedial Action Work Plan
RCRA	Resource Conservation and Recovery Act
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RP	Remedial Party
RSO	Remedial System Optimization
SAC	State Assistance Contract
SCG	Standards, Criteria and Guidelines

SCO	Soil Cleanup Objective
SMP	Site Management Plan
SOP	Standard Operating Procedures
SOW	Statement of Work
SPDES	State Pollutant Discharge Elimination System
SSD	Sub-slab Depressurization
SVE	Soil Vapor Extraction
SVI	Soil Vapor Intrusion
TAL	Target Analyte List
TCL	Target Compound List
TCLP	Toxicity Characteristic Leachate Procedure
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VCA	Voluntary Cleanup Agreement
VCP	Voluntary Cleanup Program

ES EXECUTIVE SUMMARY

The following provides a brief summary of the controls implemented for the Site, as well as the inspections, monitoring, maintenance and reporting activities required by this Site Management Plan:

Site Identification:	V-00684 , 40 Voice Road, Carle Place, New York
Institutional Controls:	1. The property may be used for commercial or industrial use;
	2. Overall compliance with Department approved SMP.
	3. Remedial party or site owner to complete and submit periodic certification of ICs and ECs.
	4. Declaration of Covenants and Restrictions
	5. All ECs must be inspected at a frequency and in a manner defined in the SMP.
	6. The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Nassau County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department.
	7. Groundwater and other environmental or public health monitoring must be performed as defined in this SMP;
	8. Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP;
	9. All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP;
	10. Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP;

Site Identification: V-00684 , 40 Voice Road, Carle Place, New York

	11. Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP;
	12. Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Declaration of Covenants and Restrictions.
	13. The potential for vapor intrusion must be evaluated for any buildings developed in the area within the IC boundaries noted, and any potential impacts that are identified must be monitored or mitigated
	14. Vegetable gardens and farming on the site are prohibited;
Engineering Controls:	1. Cover system
	2. SSDS

Inspections:	Frequency
1. Cover inspection	Annually
2. SSDS operations	Quarterly
Monitoring:	
1. Groundwater Monitoring Well Network (MW-1, MW-2, MW-3, MW-4, MW-5, MW-6S, and MW-6D)	Annually
2. SSDS Effluent	Annually
3. SSDS vapor monitoring point vacuum measurement collection	Quarterly
Maintenance:	
1. SSD System Equipment	Quarterly

Site Identification: V-00684 , 40 Voice Road, Carle Place, New York

Reporting:	
1. SSD System Inspection 2. SSDS vapor monitoring point vacuum measurement collection	Annually Quarterly
2. Periodic Review Report	Annually

Further descriptions of the above requirements are provided in detail in the latter sections of this Site Management Plan.

1.0 INTRODUCTION

1.1 General

This Site Management Plan (SMP) is a required element of the remedial program for the Johnson & Hoffman Manufacturing Corporation Site located in Carle Place, New York (hereinafter referred to as the "Site"). See Figure 1-1. The Site is currently in the New York State (NYS) Voluntary Cleanup Program (VCP) Site No. V-00684 which is administered by New York State Department of Environmental Conservation (NYSDEC).

Volunteers CAWSL Enterprises, Inc. and AMI Johnson, LLC entered into a Voluntary Cleanup Agreement (VCA) on July 16, 2004 with the NYSDEC to remediate the site. VCA Amendment No. 1 executed September 12, 2017 modified the agreement to establish the current Volunteers as CAWSL, Manley Holdings, Inc. and Ansaco Properties One, LLC (collectively, the Volunteers). A figure showing the site location and boundaries of this site is provided in Figure 1-2. The boundaries of the site are more fully described in the metes and bounds site description that is part of the Declaration of Covenants and Restrictions provided in Appendix A.

After completion of the remedial work, some contamination was left at this site, which is hereafter referred to as "remaining contamination". Institutional and Engineering Controls (ICs and ECs) have been incorporated into the site remedy to control exposure to remaining contamination to ensure protection of public health and the environment. A Declaration of Covenants and Restrictions granted to the NYSDEC, and recorded with the Nassau County Clerk, requires compliance with this SMP and all ECs and ICs placed on the site.

This SMP was prepared to manage remaining contamination at the site until the Declaration of Covenants and Restrictions is extinguished in accordance with ECL Article

71, Title 36. This plan has been approved by the NYSDEC, and compliance with this plan is required by the grantor of the Deed Restriction and the grantor's successors and assigns. This SMP may only be revised with the approval of the NYSDEC.

It is important to note that:

- This SMP details the site-specific implementation procedures that are required by the Declaration of Covenants and Restrictions. Failure to properly implement the SMP is a violation of the Declaration of Covenants and Restrictions ,which is grounds for revocation of the Certificate of Completion (COC);
- Failure to comply with this SMP is also a violation of Environmental Conservation Law, 6NYCRR Part 375 and the VCA (Index No. W1-0979-03-12 and Amendment No. 1; Site #V-00684) for the site, and thereby subject to applicable penalties.

All reports associated with the site can be viewed by contacting the NYSDEC or its successor agency managing environmental issues in New York State. A list of contacts for persons involved with the site is provided in Appendix B of this SMP.

This SMP was prepared by Environmental Resources Management, on behalf of the Volunteers, in accordance with the requirements of the NYSDEC's DER-10 ("Technical Guidance for Site Investigation and Remediation"), dated May 2010, and the guidelines provided by the NYSDEC. This SMP addresses the means for implementing the ICs and/or ECs that are required by the Declaration of Covenants and Restrictions for the site.

1.2 Revisions

Revisions to this plan will be proposed in writing to the NYSDEC's project manager. Revisions will be necessary upon, but not limited to, the following occurring: a change in media monitoring requirements, upgrades to or shut-down of a remedial system, post-remedial removal of contaminated sediment or soil, or other significant change to the

site conditions. In accordance with the Declaration of Covenants and Restrictions for the site, the NYSDEC will provide a notice of any approved changes to the SMP, and append these notices to the SMP that is retained in its files.

1.3 Notifications

Notifications will be submitted by the property owner to the NYSDEC, as needed, in accordance with NYSDEC's DER – 10 for the following reasons:

- 60-day advance notice of any proposed changes in site use that are required under the terms of the VCA, 6NYCRR Part 375 and/or Environmental Conservation Law.
- 7-day advance notice of any field activity associated with the remedial program.
- 15-day advance notice of any proposed ground-intrusive activity pursuant to the Excavation Work Plan.
- Notice within 48-hours of any damage or defect to the foundation, structures or EC that reduces or has the potential to reduce the effectiveness of an EC, and likewise, any action to be taken to mitigate the damage or defect.
- Verbal notice by noon of the following day of any emergency, such as a fire; flood; or earthquake that reduces or has the potential to reduce the effectiveness of ECs in place at the site, with written confirmation within 7 days that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.
- Follow-up status reports on actions taken to respond to any emergency event requiring ongoing responsive action submitted to the NYSDEC within 45 days describing and documenting actions taken to restore the effectiveness of the ECs.

Any change in the ownership of the site or the responsibility for implementing this SMP will include the following notifications:

- At least 60 days prior to the change, the NYSDEC will be notified in writing of the proposed change. This will include a certification that the prospective purchaser/Remedial Party has been provided with a copy of the VCA, and all approved work plans and reports, including this SMP.

- Within 15 days after the transfer of all or part of the site, the new owner's name, contact representative, and contact information will be confirmed in writing to the NYSDEC.

The table on the following page includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in Appendix B.

Table 1-1: Notifications*

Girish Desai – NYSDEC Project Manager	631- 444-0243 girish.desai@dec.ny.gov
Walter Parish - NYSDEC Regional HW Engineer	(631) 444-0240 walter.parish@dec.ny.gov
Kelly Lewandowski - NYSDEC Site Control	518-402-9553 kelly.lewandowski@dec.ny.gov
Steven Karpinski - NYSDOH	(518) 402-7860, steven.karpinski@health.ny.gov

* Note: Notifications are subject to change and will be updated as necessary.

2.0 SUMMARY OF PREVIOUS INVESTIGATIONS AND REMEDIAL ACTIONS

2.1 Site Location and Description

The site is located in Carle Place, Nassau County, New York and is identified as Section 9 Block 663 and Lot 8 on the Town of North Hempstead Tax Map (see Figure 2-1). The site is bounded to the north by Voice Road. On the opposite side of Voice Road directly north is an electrical substation owned by the Long Island Power Authority (LIPA). Located to the south and southeast of the site is the Long Island Rail Road right-of-way and the 115 Old Country Road state superfund site (Site No. 130199). To the east is a small commercial building occupied by a company doing business as "Fun World". An AM radio station is situated west of the site along with a storage yard for trucks and landscaping equipment, a commercial building and the A.K. Allen state superfund site (Site No. 130100). (see Figure 1-2 – Site Layout Map).

The site consists of a 59,000-square foot, one story building with associated parking and grass areas, on a 4.0001-acre parcel. The site was developed in 1962 on former agricultural land. Since that time, the site has been used for the production of small metal parts using processes that include metal stamping, deburring, and washing. The ground surface elevation at the site slopes gently from the north to the south. Storm water runoff from the site drains to a number of drywells and a storm water recharge basin located along the south western border of the property. A fence restricts access to the recharge basin. The two floor drains from Area of Concern 1 (AOC 1) were formerly connected to storm water discharge system that services the parking lot west of the manufacturing building.

Three concrete pad mounted transformers are located in a locked room with a metal grated roof, in the northwest corner of the building. These transformers are owned and maintained by PSEG Long Island. The building has been connected to sanitary sewer.

The boundaries of the site are more fully described in Appendix A Declaration of Covenants and Restrictions. The owner and operator of the site parcel(s) at the time of issuance of this SMP is Ansaco Properties One LLC.

2.2 Physical Setting

2.2.1 Land Use

The site is currently zoned as Industrial B (I-B) in the Town of North Hempstead. The current and intended use is the continued production of metal parts, as well as operation of a cell tower on the south part of the site.

2.2.2 Geology

There are four distinct unconsolidated geologic units that exist in the region, all of which consist of unconsolidated deposits of clay, silt, sand, and gravel that overlie southeast-sloping consolidated bedrock. The geologic units are, in descending order relative to the land surface: the Upper Pleistocene deposits, the Magothy Formation, the Raritan Clay Member of the Raritan Formation, and the Lloyd Sand Member of the Raritan Formation. The Upper Pleistocene deposits represent the natural surficial soils across the site.

Site specific geologic logs are provided in Appendix C.

2.2.3 Hydrogeology

The water table occurs approximately 50 feet below grade within the Upper Pleistocene deposits, which are hydrologically known as the Upper Glacial Aquifer. The Upper Glacial is an unconfined aquifer approximately 100 feet thick in the area of the site (50 feet are saturated). Underlying the Upper Glacial Aquifer is the semi-confined Magothy Aquifer, which is several hundred feet thick and widely used for water supply throughout Long Island.

The direction of regional groundwater flow in the vicinity of the site has been thoroughly investigated and there are numerous published studies on this subject. Based on these investigations, the regional direction of groundwater movement in the vicinity of

the site is southerly. On-site groundwater levels measured over the course of the project provide the depth of the water table to be approximately 45 to 50 feet with flow toward the south-southeast.

All potable water is supplied to the site by the Carle Place Water District public water supply system. There are no private drinking water wells at the site or in the immediate area surrounding the site.

A groundwater contour map with elevations is shown in Figure 2-2. Groundwater monitoring well construction logs are provided in Appendix C.

2.3 Investigation and Remedial History

2.3.1 Investigation and Reporting

The following narrative provides a remedial history timeline and a brief summary of the available project records to document key investigative and remedial milestones for the site. Full titles for each of the reports referenced below are provided in Section 8.0 - References.

The site was developed in 1962 on former agricultural land. Since that time, the site has been used for the production of small metal parts using processes that include metal stamping, deburring, and washing.

In approximately 1975, the current boiler room was added onto the southeast corner of the original structure. In 1982, the building was extended to the south, increasing the square footage by about 25% and completing the footprint that exists today.

Since 1962, J&H#1 followed by J&H#2 has been in the business of fabricating small metal parts at the site. The predominant operations in this process have been consistent over the years and included metal stamping, forming, drilling, deburring, washing and drying.

On a much smaller scale, welding, brazing, chrome plating, heat-treating (annealing) and oil quenching were occasionally done for tool and die repair. The raw materials used in the production process included aluminum, stainless steel, cobalt steel, nickel, iron, copper and brass. Process chemical usage has included cutting oil, lubricating

oil, rust preventative and parts cleaner (detergent). The major waste products from the manufacturing process include metal shavings and waste oil.

Between 1982 and 1996, several solvents were used in the finishing process for certain customer orders. The chemicals that were used included: trichloroethene (TCE), which was used for degreasing, tetrachloroethene (PCE), which was used as a drying agent, and isopropyl alcohol (IPA), which was also used as a drying agent. Use of PCE and TCE was discontinued by the end of 1996. The use of IPA was discontinued in 1997. A history of the site ownership is provided below:

- Johnson and Hoffman Manufacturing Corporation ("J&H#1) owned and operated the site from 1962 to 2004.
- In 2004, J&H#1 and American Engineered Components ("AEC") the owner of all outstanding stock in J&H #1, among others, filed for bankruptcy protection in the United States Bankruptcy Court for the District of Delaware. Pursuant to an order of the Bankruptcy Court dated April 21, 2004, AMI Johnson LLC ("AMI") purchased the assets of J&H#1 and AEC. As part of that purchase, title to the site was assigned to NL Ventures. J&H#1 was dissolved after the sale of assets.
- From April 2004 until February 2005, AMI operated the site and continued to do business under a newly formed entity with the name of Johnson & Hoffman Manufacturing Corp. ("J&H#2").
- AMI was voluntarily cancelled on July 14, 2005 with the Delaware Office of the Secretary of State. In February 2005, prior to this cancellation, Johnson & Hoffman, LLC ("J&H LLC") purchased the assets of AMI. Concurrently with J&H LLC's asset purchase, title to the site was transferred to Nassau County Industrial Development Agency ("NCIDA") as fee owner and Manley Holdings Inc. ("Manley"), as beneficial owner, in conjunction with financing provided by NCIDA to Manley and J&H LLC.
- NCIDA transferred title to the site to Manley on August 26, 2015.
- J&H LLC operated on the site until October 2, 2015.

- On October 2, 2015, Manley sold the site to Ansaco Properties One, LLC ("Ansaco Properties") and J&H LLC sold its assets to Ansaco Acquisition Company, LLC ("Ansaco Acquisition").
- Ansaco Properties is the current owner and Ansaco Acquisition is the current operator of the site.

Multiple investigations have been performed to characterize the nature and extent of contamination at the site. The results of these investigations are described in detail in the following reports:

Table 2-1: Environmental Reports

Environmental Report	Author	Date
Phase I Environmental Site Assessment	ERM	Dec-96
Results of Phase II Investigation	ERM	Feb-97
Environmental Due Diligence Review	McCulley, Frick & Gilman	Jan-97
Due Diligence Report	MAC Consultants	Apr-98
Phase I Environmental Site Assessment	Liesch Associates	Apr-99
Site Investigation Report and Proposed Remedial Action	ERM	Aug-03
Memorandum regarding Compressor Room Dry Well Closure in Late 1998/Early 1999	Liesch Associates	Oct-04
Interim Remedial Measure Soil Vapor Extraction System	ERM	Feb-06
Engineering Report – Soil Vapor Extraction System	ERM	Jul-06
Addendum 1- Interim Remedial Measure Soil Vapor Extraction System	ERM	Dec-09
Remedial Investigation Report	ERM	Oct-11
Addendum 2- Interim Remedial Measure Soil Vapor Extraction System	ERM	May-11
Construction Completion Report for AOC 7	ERM	Aug-12

Environmental Report	Author	Date
Remedial Investigation Report-Addendum	ERM	Jan-14
Remedial Action Work Plan	ERM	Dec-16

As detailed in the reports above, subsurface investigations were performed at the site to evaluate the nature and extent of soil, groundwater and soil vapor potentially affected by site activities. Based on knowledge of past operations and subsequent investigation results, Areas of Concern (AOCs) were identified at the site. The following

AOCs were defined to guide the site characterization for soil:

AOC 1: Drainage systems that include: (1) two floor drains located south of the compressor and annealing rooms and the discharge point in dry well SWCB-1; and (2) an isolated former dry well/drain in the compressor room;

AOC 2: Concrete wastewater trench in the northern section of the Finishing Department;

AOC 3: Boiler Room dry wells;

AOC 4: Accumulation of scrap parts and tumbling media on the ground surface in the southwest portion of the site;

AOC 5: Storm water recharge basin located in the southwest portion of the site;

AOC 6: 5,000-gallon No. 2 fuel oil UST;

AOC 7: PCE-impacted soil near the southeast corner of the building;

AOC 8: The SE Dry Well is located outside the southeast corner of the building; and

AOC 9: The NE Dry Well is located outside the northeast corner of the building.

A map of the AOC locations is provided in 2-3. Numerous samples were taken at the site from surface and subsurface soils, and groundwater, and analyzed for the following: volatile organic compounds (VOCs), Semi-volatile organic compounds (SVOCs), pesticides/PCBs, and metals. Soil vapor, sub-slab vapor and indoor air were analyzed for

VOCs. Based upon investigations conducted to date, the primary contaminants of concern (COC) at the site are VOCs such as tetrachloroethene (PCE), trichloroethene (TCE), cis, 1,2 dichloroethene (DCE) and SVOCs such as benzo(a)anthracene, benzo (b) fluoranthene, benzo (k) fluoranthene, chrysene and indeno (1,2,3-cd)pyrene. These compounds are also called polycyclic aromatic hydrocarbons (PAHs). PCE was detected at elevated levels in the on-site soils, on-site and off-site groundwater and on-site soil vapor. PAH compounds were detected in on-site soils and on-site and off-site groundwater.

Groundwater: Groundwater sampling found that shallow groundwater at the site was impacted by VOCs, primarily PCE, at a maximum concentration of 240 parts per billion (ppb) in on-site monitoring well MW-01. TCE and cis 1,2 DCE were also found in the groundwater on the property at 22ppb and 43 ppb respectively in monitoring well MW-05. The last groundwater sampling round detected PCE, TCE and cis 1,2 DCE at maximum concentration of 13.3 ppb, 0.47 ppb and non-detect respectively in MW-01. Two of the five off-site groundwater profile borings detected PCE at a maximum concentration of 52 ppb in a sample collected at 800 feet south of the site boundary. TCE and cis 1,2 DCE were detected at 14 ppb and 29 ppb respectively in off-site groundwater profile borings. However, results of PCE, TCE and cis 1,2 DCE in groundwater samples collected from off-site monitoring wells installed in the vicinity were non-detect.

Several PAHs such as benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene and indeno(1,2,3-cd) pyrene were detected in excess of the NYSDEC's ambient groundwater quality standards and guidance values in on-site and off-site monitoring wells. Benzo(a)anthracene, benzo(b)fluoranthene and chrysene were detected at maximum concentration of 0.862 ppb, 2.19 ppb and 1.43 ppb, respectively in on-site monitoring wells. Benzo (a) anthracene, benzo(b)fluoranthene and chrysene were detected at maximum concentration of 0.437 ppb, 0.770 ppb and 0.559 ppb respectively in off-site monitoring wells.

Soil: Soil samples were collected from several AOCs. PAHs were found exceeding soil clean up objectives (SCOs) for commercial use and protection of groundwater in

compressor/annealing room drainage system (AOC 1), former scrap metal parts and tumbling media piles area in the southwest portion of the site (AOC 4), stormwater recharge basin located in the southwest portion of the site (AOC 5), southeast dry well located outside the southeast corner of the building (AOC 8) and northeast dry well located outside the northeast corner of the building (AOC 9). Benzo(a)anthracene, benzo(b)fluoranthene and chrysene were detected at maximum concentrations of 250 ppm, 440 ppm and 400 ppm respectively. PAHs were found in several drywells at various depths from 6.5 feet bgs to 31.5 feet bgs. Benzo(a)anthracene benzo(a)pyrene, benzo(b)fluoranthene and chrysene were detected in surface soils in AOC 4 at maximum concentrations of 1.3 ppm,1.400 ppm, 2.2 ppm and 1.7 ppm respectively.

The Site Investigation delineated the extent of PCE and other volatile organic compounds in excess of the SCOs for protection of groundwater in an area located south and southeast of the site building (AOC 7). The PCE was detected at maximum concentrations of 300 ppm, TCE was detected at 12.4ppm and cis1,2 DCE was detected at 4.9 ppm in AOC 7 exceeding the soil cleanup objectives (SCOs) for the protection of groundwater. This area was addressed by the IRM completed in September, 2011.

Soil Vapor: Eight soil vapor samples were collected at 5 feet bgs in March 2006. PCE was detected from 0.31 ug/m3 to 140,000 ug/m3, TCE was detected from non-detect to 3300 ug/m3 and 1,2 Cis-DCE was detected from non-detect to 8.7 ug/m3 respectively.

Soil vapor samples were collected in March 2007 along the southern property boundary at two locations where soil vapor samples were previously collected. Total four samples were collected at depths of 5 and 25 feet bgs. PCE was detected from 2 to 1600 ug/m3, TCE was detected from non-detect to 24 ug/m3 and 1,2 cis- DCE was non-detect respectively at 5 feet bgs respectively. At 25 feet depth bgs, PCE was detected from 440 ug/m3 to 19,000 ug/m3, TCE was detected from 15 ug/m3 to 710 ug/m3 and 1,2 cis-DCE was detected from non-detect to 3.7 ug/m3 respectively. Soil samples were at collected at depths 7 feet bgs and 25 feet bgs in March 2017 along the southern property boundary at two locations where soil vapor samples were collected. PCE was non-detect at 7 feet bgs

and was detected at 6 ppb at 25 feet bgs, TCE and cis- 1,2 DCE were not detected respectively.

Five soil vapor samples were collected at 5 feet bgs in December 2009. Two samples were collected along the southern property boundary at two locations were samples were previously collected in 2006 and 2007. PCE was detected from 8.1 ug/m3 to 1840 ug/m3, TCE was detected from 1.3 ug/m3 to 48 ug/m3 and cis 1,2 –DCE from non-detect to 44 ug/m3 respectively. One soil vapor sample was collected along south east property boundary. PCE was detected at 0.33 ug/m3 and TCE and cis 1,2 DCE were non-detect. Two soil vapor samples were collected along eastern property boundary and PCE was detected from 1.3ug/m3 to 4.1 ug/m3, TCE was detected from 0.37 and 13 ug/m3 and cis-1,2 DCE was non-detect respectively.

On-site Sub-slab Vapor and Indoor Air: Soil vapor intrusion (SVI) evaluations were conducted at the on-site building and four off-site properties to evaluate impacts to indoor air in the on-site building and buildings adjacent to the site. Sub-slab vapor and indoor air samples were collected from five locations inside the on-site building in July 2011. PCE was detected at 4,200 ug/m3 in a sub slab soil vapor sample (and 16 ug/m3 in indoor air sample at one of the five locations. These levels indicate the potential for exposures through soil vapor intrusion and action to reduce exposures were recommended. Soil vapor intrusion was addressed by the operation of the SVE system. At the conclusion of the soil remedy in 2011, the SVE system was kept operating as a sub-slab depressurization (SSD) system with a single vapor extraction point.

2.3.2 Remedial History

2.3.2.1 AOC 7

An interim remedial measure (IRM) was implemented to address PCE impacted soils in a former PCE/TCE storage and transfer area (Area of Concern 7) associated with areas located south and southeast of the manufacturing building. A soil vapor extraction (SVE) system was installed primarily to remediate the PCE impacted soils and to provide sub-slab depressurization beneath the manufacturing building to prevent the migration of

vapors into the buildings. The SVE system uses a blower attached to several soil vapor extraction wells to draw air through soils. This flow of air allows VOCs to evaporate from the soils and into the air spaces between soil particles. Contaminants are then drawn toward the wells and into the treatment system where the vapors are treated prior to discharge to the atmosphere.

The SVE system was installed in March 2006. Soil samples were collected in 2010 to assess the progress of the soil remediation by SVE system. Two of ten locations detected PCE in soil in exceeding soil cleanup objectives (SCOs) for the protection of groundwater. An excavation of PCE impacted soils exceeding SCOs for the protection of groundwater from the area was completed as a separate IRM to remove the soil instead of modifying the SVE system. In total, approximately 213 tons (130 cubic yards) of impacted soil was excavated and disposed off-site in 2011. At the conclusion of the IRM and removal of some source material, the remaining portions of the SVE system was converted to a sub-slab depressurization (SSD) system consisting of a single extraction point (VEW-5) located beneath the southeast corner of the building. The SVE system continues to operate with a single extraction well to provide sub-slab depressurization beneath the manufacturing building where mitigation is required and maintains designed vacuum of 0.004 inches of water. A construction completion report for AOC 7 dated August 27, 2012 was prepared to document the implementation of remedial actions.

2.3.2.2 Remedial Action- 2017

A remedial action was preformed from September through November 2017 in accordance with the December 2016 Remedial Action Work Plan. Soil above commercial SCOs was removed from the remaining AOCs and replaced with clean fill as detailed below:

AOC 1: Soil was removed from one dry well SWCB-01 down to a depth of 22 feet below grade.

AOC 4: Surface soil was removed at two locations for this AOC. The primary excavation (AOC4) measured approximately 28x28 feet and the secondary (AOC 4J) measured approximately 17.5x20 feet. Each excavation was 1.5 feet deep.

AOC 5: Soil was removed from one dry well SWCB-02 down to a depth of 14feet below grade. Soil was removed from one dry well SWCB-03 down to a depth of 11.5 feet below grade. Additional soil removal was performed at the recharge basin associated with this AOC. The excavation was approximately 20x20x 9 feet.

AOC 8: Soil was removed from the SE dry well down to a depth of 27.5 feet below grade.

AOC 9: Soil was removed from the NE dry well down to a depth of 22feet below grade.

All dry well locations were confirmed through the collection of bottom samples and excavations though bottom and sidewall samples. A total of 515 tons of non-hazardous soils were disposed off-site as part of this remedy.

2.4 Remedial Action Objectives

The Remedial Action Objectives (RAOs) for the site as listed in the Decision Document dated September 20, 2017 are as follows:

Groundwater

RAOs for Public Health Protection

- Prevent ingestion of groundwater with contaminant levels exceeding drinking water standards.
- Prevent contact with, or inhalation of, volatiles from contaminated groundwater.

RAOs for Environmental Protection

- Restore ground water aquifer to pre-disposal/pre-release conditions, to the extent practicable.
- Remove the source of ground or surface water contamination.

Soil

RAOs for Public Health Protection

- Prevent ingestion/direct contact with contaminated soil.
- Prevent inhalation of or exposure from contaminants volatilizing from contaminants in soil.

RAOs for Environmental Protection

- Prevent migration of contaminants that would result in groundwater or surface water contamination.

Soil Vapor

RAOs for Public Health Protection

- Mitigate impacts to public health resulting from existing, or the potential for, soil vapor intrusion into buildings at a site.

2.5 Remaining Contamination

As indicated in the RAWP, the site is not being remediated to a condition of unrestricted use. At the completion of the scope of the RAWP contamination in soil, groundwater, and soil vapor will remain and is addressed herein.

2.5.1 Soil

Based upon current zoning and following the filing of the Declaration of Covenants and Restrictions the property will be limited to Commercial or Industrial uses. The remedial actions performed at the site have removed soils above the Commercial SCO to the extent practical. However, as indicated in the RAWP, some soils with PAH detections above Commercial SCOs remain on site and are to be addressed through this SMP.

The soils are found in two dry-wells on site, specifically, SWCB-02 and SWCB-03 at depths indicated in the table below, with locations shown on Figure 2-3. An estimated

40 cubic yards of impacted soils remains on site underneath soil cover between the two locations. Removal of impacted soils was not performed as to not to undermine the structural integrity of the site drainage dry wells.

Table 2-2 Soil Remaining On-Site Above Commercial SCOs

Dry Well	Soil Interval Above Commercial SCOs (Depth Below Base of Dry Well)	Assumed Soil Interval Above Commercial SCOs (Depth Below Ground Surface)	Ring Diameter (ft)
SWCB-02	19.0 to 25.0 feet	28.0 to 34.0 feet	10
SWCB-03	24.0 to 29.0 feet	30.5 to 35.5 feet	7

Table 2-3 and summarizes the results of all soil samples collected that exceed the Unrestricted Use SCOs and the Commercial Use SCOs at the site after completion of remedial action.

If additional excavation is performed on site, care must be taken not to impact current site utilities. Municipal water and sewer service the site and adjacent parcels. The Carle Place Water District provides water and Nassau County provides sanitary sewer service. The sanitary sewer system discharges to the Cedar Creek Water Pollution Control Plant in Wantagh, New York. PSEG Long Island provides electrical service to the site and adjacent lot parcels. Natural gas service is provided to the site and general vicinity. Three concrete pad mounted transformers are located in a locked room, with a metal grated roof, in the northwest corner of the building. These transformers are owned and maintained by PSEG Long Island and are believed to have been installed when the original building was erected in 1962. The exteriors of the transformers were observed to have surface rust but there was no evidence of any staining on the concrete pad. PSEG Long Island was contacted to inquire as to the possible presence of PCBs in the transformers. ERM contacted the Waste Management & Environmental Response Division of PSEG Long Island and spoke with the Manager, Mr. Steven Dalton, who stated that the distribution transformers contain mineral oil, not PCB oil. No other evidence of potential PCB-containing equipment was observed.

2.5.2 Sediment

No surface water exists at the Site; therefore sediment was not a media of concern. No investigation or remediation of sediment was conducted.

2.5.3 Groundwater

Groundwater investigations at the site have included testing for full TCL/TAL parameters. Results of these investigations revealed the presence of VOCs and PAHs at concentrations requiring further evaluation. Wells in the monitoring network include MW-01, MW-02, MW-3, MW-4, and MW-05 onsite and MW-06S and MW-06D off site.

2.5.3.1 VOCs in Groundwater

Historic sampling results indicated that shallow groundwater on-site was impacted by VOCs, primarily PCE, up to the downgradient property boundary. Figure 2-4 shows the location of these wells, along with the other site-related monitoring wells and recent PCE concentrations.

Breakdown products, TCE and cis-1, 2-dichloroethene, have been detected on-site, indicating that natural degradation is occurring. No vinyl chloride is present. Vertical delineation has also been determined. In the off-site well cluster (MW-06), both wells are screened at depth, and both show no evidence of the VOC plume at this location. The RI, therefore, concluded that the plume is limited to the upper saturated zone and terminates upgradient of the MW-06 well cluster.

The RI also noted that groundwater quality has significantly improved over the course of the project and subsequent to the start of on-site remedial activities in AOC 7. At the site itself, this is demonstrated by the historic sampling record for the three on-site wells located on the south (downgradient) side of the property. PCE concentrations have declined in all three of these wells as indicated below.

Table 2-4: History of On-Site PCE in Groundwater

Well	PCE (µg/L) Feb 1999	PCE (µg/L) Nov 2000	PCE (µg/L) May 2002	PCE (µg/L) Oct 2005	PCE (µg/L) Jan 2008	PCE (µg/L) Sep 2010	PCE (µg/L) Feb 2013
MW-01	50.4	190	240	42	26	13	13.3
MW-02	217	84	55	52	4	1.2	2.2
MW-05	No data	170	68	120	<1	4.0	1.4

Off-site groundwater quality has also improved significantly. The table below groups the off-site sampling data by location and depth interval:

Table 2-5: History of Off-Site PCE in Groundwater

Sample ID & Date	Depth (ft below grade)	PCE (µg/L)
OS-03 (Oct. 2005)	75-79	52
OS-04 (Oct. 2005)	75-79	25
MW-06S (Jan. 2008)	75-85	<1
MW-06S (Sept. 2010)	75-85	<1
OS-03 (Oct. 2005)	96-100	9
OS-04 (Oct. 2005)	96-100	<5
MW-06d (Jan. 2008)	115-125	<1
MW-06d (Sept. 2010)	115-125	<1

This table compares the PCE results from the off-site well cluster (MW-06S & MW-06D), with the equivalent data from proximal Geoprobe samples (OS-03 and OS-04) collected in October 2005. Based on this comparison, the improvement in groundwater quality is self-evident.

Overall, groundwater quality has markedly improved and the downgradient extent of the plume has decreased significantly during this project. Only trace levels of VOCs remain, and these are expected to continue diminishing over time due to the excavation of the remaining on-site VOC source material conducted in August 2011

2.5.3.2 SVOCs in Groundwater

As shown in Figure 2-4, two monitoring wells at the site (MW-01 and MW-04) contain PAHs in groundwater at the site above the Division of Water Technical & Operational Guidance Series 1.1.1 - Ambient Water Quality Standards and Guidance Values (GWQS).

Two off-site wells (MW-06S and MW-06D) also contain PAHs above GWQS. The highest concentrations at the site are found at MW-04. Between the 2010 and 2012 sampling events, there was an approximate 85% reduction in PAH concentrations in MW-04. The 2017 soil remedy removed the majority of soil with PAHs above the SCOGW. Therefore, PAH concentrations in groundwater are expected to continue decreasing. As discussed further in this document, PAH concentrations will be monitored periodically from on-site and off-site monitoring wells.

Figure 2-5 summarizes the results of all groundwater samples that exceed the SCGs after completion of the remedial action.

2.5.4 Surface Water

No surface water exists at the site; therefore surface water was not a media of concern. No investigation or remediation of surface water was conducted.

2.5.5 Soil Vapor

SVI evaluations were performed as part of the RI and the AOC 7 IRM to evaluate impacts to indoor air in the on-site J&H building and buildings adjacent to the J&H property. All SVI sampling data was evaluated in accordance with the Decision Matrices in the document entitled "Guidance for Evaluating Soil Vapor Intrusion in the State of New York" (NYSDOH, Amended May 2017.

Due to the known presence of PCE in soil beneath the building, a mitigation/remediation system was installed as an IRM in the form of a soil vapor extraction (SVE) system in 2006. The IRM was completed in August 2011, by excavating the remaining PCE-impacted soil. At the conclusion of the soil remedy, the SVE system was converted to a sub-slab depressurization (SSD) system consisting of a single extraction point (VEW-5) located beneath the southeast corner of the building. Several on-site sampling events were conducted to evaluate the on-site building for SVI.

The sub-slab soil gas and indoor air concentrations at the site have generally been declining over time, with the exception of the March, 2013, round, where some rebound was observed. A summary of the recent results for PCE (the primary constituent of concern), as well as the response action from the NYSDOH Decision Matrices, is provided in the table below:

Table 2-6: PCE SVI Sampling Results (data in μg/m^3)

Sample	Station 1		Station 2		Station 3		Station 4		Station 5	
Date	IA-01	SS-01	IA-02	SS-02	IA-03	SS-03	IA-04	SS-04	IA-05	SS-05
Jul. 2011	6.8	75.9	8.1	171	69.8	997	16	4200	42	1040
	TRA		Monitor/Mitigate		Mitigate		Mitigate		Mitigate	
Dec. 2011 (Note 1)	---	5.9	---	235	---	339	---	623	---	698
Feb. 2012	0.65	2.6	2.2	349	2.5	133	2	220	1.4	1480
	NFA		Monitor		Monitor		Monitor		Mitigate	
Dec. 2012	3.7	2.9	0.41	12	1.1	42	0.37	243	0.35	183
	TRA		NFA		NFA		Monitor		Monitor	
Mar. 2013	3.1	8.8	14	167	1.7	359	1.4	216	2.1	3380
	TRA		Monitor/Mitigate		Monitor		Monitor		Mitigate	
Mar. 2014	1.8	1.9	2.4	24	0.95	31	1.6	149	1.3	0.88
	TRA		TRA		NFA		Monitor		TRA	
May 2016 (Note 2)	---	2.2	No sample		No sample		No sample		No sample	
	NFA									

Note 1: During the December 2011 event, it was discovered that a PCE-based parts cleaner was in use at the facility. This invalidated the PCE indoor air results from this sampling round. However, the sub-slab concentrations from this event remain as a useful data set.

Note 2: At the request of NYSDOH, a sub-slab sample was collected from SS-01 (office area) to confirm that the potential for soil vapor intrusion is not present in this area. The result indicates that either NFA or TRA would be the required response action depending on the indoor air level. Therefore, vapor intrusion is not a concern while the SSDS is operating, and no further remedial action is required in this area.

IA – indoor air sample

SS – sub-slab vapor sample
NFA – No further action
TRA - Take reasonable and practical actions to identify source(s) and reduce exposures

The locations of these samples are presented in Figure 2-6. The generally downward concentration trend reflects the efficacy of the completed remedial actions in AOC 7, which have substantially removed the vapor source at the site. Further discussion regarding sub-slab depressurization of the J&H building is provided in Sections 3.0 and 4.0.

3.0 INSTITUTIONAL AND ENGINEERING CONTROL PLAN

3.1 General

Since remaining contamination exists at the site, Institutional Controls (ICs) and Engineering Controls (ECs) are required to protect human health and the environment. This IC/EC Plan describes the procedures for the implementation and management of all IC/ECs at the site. The IC/EC Plan is one component of the SMP and is subject to revision by the NYSDEC.

This plan provides:

- A description of all IC/ECs on the site;
- The basic implementation and intended role of each IC/EC;
- A description of the key components of the ICs set forth in the Declaration of Covenants and Restrictions;
- A description of the controls to be evaluated during each required inspection and periodic review;
- A description of plans and procedures to be followed for implementation of IC/ECs, such as the implementation of the Excavation Work Plan (EWP) (as provided in Appendix D) for the proper handling of remaining contamination that may be disturbed during maintenance or redevelopment work on the site; and
- Any other provisions necessary to identify or establish methods for implementing the IC/ECs required by the site remedy, as determined by the NYSDEC.

3.2 Institutional Controls

A series of ICs is required by the Decision Document to: (1) implement, maintain and monitor Engineering Control systems; (2) prevent future exposure to remaining contamination; and, (3) limit the use and development of the site to Commercial or Industrial uses only. Adherence to these ICs on the site is required by the Declaration of Covenants and Restrictions and will be implemented under this SMP. ICs identified may

not be discontinued without an amendment to or extinguishment of the Declaration of Covenants and Restrictions. The ICs apply to the whole property with boundaries shown on Figure 3-1. These ICs are:

- The property may be used for commercial or industrial use;
- Overall compliance with Department approved SMP.
- Remedial party or site owner to complete and submit periodic certification of ICs and ECs.
- All ECs must be operated and maintained as specified in this SMP;
- All ECs must be inspected at a frequency and in a manner defined in the SMP.
- The use of groundwater underlying the property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Nassau County Department of Health to render it safe for use as drinking water or for industrial purposes, and the user must first notify and obtain written approval to do so from the Department.
- Groundwater and other environmental or public health monitoring must be performed as defined in this SMP;
- Data and information pertinent to site management must be reported at the frequency and in a manner as defined in this SMP;
- All future activities that will disturb remaining contaminated material must be conducted in accordance with this SMP;
- Monitoring to assess the performance and effectiveness of the remedy must be performed as defined in this SMP;
- Operation, maintenance, monitoring, inspection, and reporting of any mechanical or physical component of the remedy shall be performed as defined in this SMP;
- Access to the site must be provided to agents, employees or other representatives of the State of New York with reasonable prior notice to the property owner to assure compliance with the restrictions identified by the Declaration of Covenants and Restrictions.
- The potential for vapor intrusion must be evaluated for any buildings developed on the property and any potential impacts that are identified must be monitored or mitigated; and

- Vegetable gardens and farming on the site are prohibited;

3.3 Engineering Controls

3.3.1 Cover (or Cap)

Exposure to remaining contamination at the site is prevented by a cover system placed over affected areas of the site. This cover system is comprised of a minimum of 12 inches of clean soil. Figure 3-1 presents the location of the cover system. The Excavation Work Plan (EWP) provided in Appendix D outlines the procedures required to be implemented in the event the cover system is breached, penetrated or temporarily removed, and any underlying remaining contamination is disturbed. Procedures for the inspection of this cover are provided in the Monitoring and Sampling Plan included in Section 4.0 of this SMP. Any work conducted pursuant to the EWP must also be conducted in accordance with the procedures defined in a Health and Safety Plan (HASP) and associated Community Air Monitoring Plan (CAMP) prepared for the site and provided in Appendix G.

A site cover currently exists consisting of the existing buildings and pavement at the site. The site cover will be maintained as a component of any future site development to allow for the commercial use of the site, which will consist either of the structures such as buildings, pavement, sidewalks comprising the site development or a soil cover in areas where the upper one foot of exposed surface soil will exceed the applicable SCOs. Where a soil cover is required it will be a minimum of one foot of soil, meeting the SCOs for cover material as set forth in 6 NYCRR Part 375-6.7(d) for commercial use. The soil cover will be placed over a demarcation layer, with the upper six inches of the soil of sufficient quality to maintain a vegetation layer. Any fill material brought to the site will meet the requirements for the identified site use as set forth in 6 NYCRR Part 375-6.7(d).

3.3.2 Sub-slab Depressurization System

A multipoint soil vapor extraction system (SVE) was installed as part of an IRM to address SVI concerns at AOC 7 in 2006. The effectiveness of the remedy was assessed and excavation was performed in 2011 to remove exterior soils that were not remediated by the system. Concurrent with the excavation, the SVE system was converted to a single point SSDS with an extraction point at VEW-5. The system is currently operating with an equipment trailer outside the south wall of the facility with the overall layout shown on Figure 2-3.

The primary goal of the SSDS is to mitigate soil vapors beneath the site building and serve as a control on potential vapor intrusion to the building interior.

The approximate operational flowrate for the system is 200 cubic feet per minute. The system also included granulated activated carbon treatment when installed; however, this was discontinued as a result of decreased influent concentrations at completion of the IRM and approval from NYSDEC to discharge to the atmosphere in 2012. The system is exempt from a permit based upon the calculated mass discharge. Components of the SSDS are provided below:

- One SVE blower (175 scfm);
- Equipment trailer/enclosure;
- One moisture separator (currently off-line due to history of non-use);
- Emissions control system – exhaust stack only;
- Control System; and supporting instrumentation.

Appurtenant equipment includes:

- Acoustical/weather enclosure;
- Inline air filter with inlet vacuum gauge;
- Vacuum relief valve;
- High discharge temperature switch (explosion proof (XP));
- High differential pressure switch (XP);

- Low flow switch (XP);
- Inlet vacuum gauge;
- Discharge pressure gauge;
- Discharge temperature gauge;
- Dilution air valve;
- Bleed-off vent valve; and
- Moisture separator with a 40-gallon storage capacity and a high level switch (XP).

Procedures for operating and maintaining the SSDS system are documented in the Operation and Maintenance Plan (Section 5.0 of this SMP). As built drawings, signed and sealed by a professional engineer, are included in Appendix I – Operations and Maintenance Manual. Figure 2-3 shows the location of the ECs for the site.

3.3.3 Criteria for Completion of Remediation/Termination of Remedial Systems

Generally, remedial processes are considered completed when monitoring indicates that the remedy has achieved the remedial action objectives identified by the decision document. The framework for determining when remedial processes are complete is provided in Section 6.4 of NYSDEC DER-10.

3.3.3.1 - Cover (or Cap)

The cover system is a permanent control and the quality and integrity of this system will be inspected at defined, regular intervals in accordance with this SMP in perpetuity.

3.3.3.2 - Sub-Slab Depressurization (SSD) System

The active SSD system will not be discontinued unless prior written approval is granted by the NYSDEC and the NYSDOH. In the event that monitoring data indicates that the SSD system may no longer be required, a proposal to discontinue the SSD system will be submitted by the Volunteers to the NYSDEC and NYSDOH.

3.3.3.3 - Monitoring Wells associated with Monitored Natural Attenuation

Groundwater monitoring activities to assess natural attenuation will continue, as determined by the NYSDEC with consultation with NYSDOH, until residual groundwater concentrations are found to be consistently below ambient water quality standards, the site SCGs, or have become asymptotic at an acceptable level over an extended period. In the event that monitoring data indicates that monitoring for natural attenuation may no longer be required, a proposal to discontinue the system will be submitted by the Volunteers. Monitoring will continue until permission to discontinue is granted in writing by the NYSDEC. If groundwater contaminant levels become asymptotic at a level that is not acceptable to the NYSDEC, additional source removal, treatment and/or control measures will be evaluated.

4.0 MONITORING AND SAMPLING PLAN

4.1 General

This Monitoring and Sampling Plan describes the measures for evaluating the overall performance and effectiveness of the remedy. This Monitoring and Sampling Plan may only be revised with the approval of the NYSDEC. Details regarding the sampling procedures, data quality usability objectives, analytical methods, etc. for all samples collected as part of site management for the site are included in the Quality Assurance Project Plan provided in Appendix F.

This Monitoring and Sampling Plan describes the methods to be used for:

- Sampling and analysis of all appropriate media (e.g., groundwater, indoor air, soil vapor);
- Assessing compliance with applicable NYSDEC standards, criteria and guidance (SCGs), particularly groundwater standards and Part 375 SCOs for soil; and
- Evaluating site information periodically to confirm that the remedy continues to be effective in protecting public health and the environment;

To adequately address these issues, this Monitoring and Sampling Plan provides information on:

- Sampling locations, protocol and frequency;
- Information on all designed monitoring systems;
- Analytical sampling program requirements;
- Inspection and maintenance requirements for monitoring wells;
- Monitoring well decommissioning procedures; and

- Annual inspection and periodic certification.

Reporting requirements are provided in Section 7.0 of this SMP.

4.2 Site – Wide Inspection

Site-wide inspections will be performed at a minimum of once per year. Modification to the frequency or duration of the inspections will require approval from the NYSDEC. Site-wide inspections will also be performed after all severe weather conditions that may affect ECs or monitoring devices. During these inspections, an inspection form will be completed as provided in Appendix H – Site Management Forms. The form will compile sufficient information to assess the following:

- Compliance with all ICs, including site usage;
- An evaluation of the condition and continued effectiveness of ECs;
- General site conditions at the time of the inspection;
- The site management activities being conducted including, where appropriate, confirmation sampling and a health and safety inspection; and
- Confirm that site records are up to date.

Inspections of all remedial components installed at the site will be conducted. A comprehensive site-wide inspection will be conducted and documented according to the SMP schedule, regardless of the frequency of the Periodic Review Report. The inspections will determine and document the following:

- Whether ECs continue to perform as designed;
- If these controls continue to be protective of human health and the environment;
- Compliance with requirements of this SMP and the Declaration of Covenants and Restrictions;

- Achievement of remedial performance criteria; and
- If site records are complete and up to date; and

Reporting requirements are outlined in Section 7.0 of this plan.

Inspections will also be performed in the event of an emergency. If an emergency, such as a natural disaster or an unforeseen failure of any of the ECs occurs that reduces or has the potential to reduce the effectiveness of ECs in place at the site, verbal notice to the NYSDEC must be given by noon of the following day. In addition, an inspection of the site will be conducted within 5 days of the event to verify the effectiveness of the IC/ECs implemented at the site by a qualified environmental professional, as determined by the NYSDEC. Written confirmation must be provided to the NYSDEC within 7 days of the event that includes a summary of actions taken, or to be taken, and the potential impact to the environment and the public.

4.3 Treatment System Monitoring and Sampling

4.3.1 SSDS Monitoring

Monitoring of the SSDS will be performed on a routine basis, as identified in Table 4-1 SSDS Monitoring Requirements and Schedule (see below). Modification to the frequency or sampling requirements will require approval from the NYSDEC. A visual inspection of the complete system will be conducted during each monitoring event. Unscheduled inspections and/or sampling may take place when a suspected failure of the SSDS system has been reported or an emergency occurs that is deemed likely to affect the operation of the system. SSDS components to be monitored include, but are not limited to, the components included in the table below.

Table 4-1 – SSDS Monitoring Requirements and Schedule

Remedial System Component	Monitoring Parameter	Operating Range	Monitoring Schedule
SSDS Influent	PID	0-1000 ppm	Quarterly
SSDS Blower	Flow Rate	0 – 250 CFM	Quarterly
Control Panel	Runtime	Total Hours	Quarterly
Gauges	Temperature	0-150 deg F	Quarterly
Gauges	Vacuum Pressure	0 to (-) 100 in" H20	Quarterly
General system piping	Visual	Acceptable/Not Acceptable	Quarterly
Vacuum Influence Points	Vacuum Pressure	equal to or greater than (-)0.004 inches H20	Quarterly

A complete list of components to be inspected is provided in the Inspection Checklist, provided in Appendix H - Site Management Forms. If any equipment readings are not within their specified operation range, any equipment is observed to be malfunctioning or the system is not performing within specifications; maintenance and repair, as per the Operation and Maintenance Plan, is required immediately.

4.3.2 SSDS Sampling

Samples shall be collected from the blower discharge on a routine basis. Sampling locations, required analytical parameters and schedule are provided in the table below.

Table 4-2 – Remedial System SSDS Sampling Requirements and Schedule

Sampling Location	Analytical Parameters	Schedule
	VOC (EPA Method TO-15)	
SSDS-Effluent	X	Annually

Modification to the frequency or sampling requirements will require approval from the NYSDEC. Detailed sample collection and analytical procedures and protocols are provided in Appendix E – Field Standard Operating Procedures and Appendix F – Quality Assurance Project Plan.

In general, a representative vapor sample will be collected from the SSDS effluent point (i.e., the blower exhaust) for a total of one sample. The sample will be collected utilizing a SUMMA® canister with analysis of VOCs via the USEPA TO-I5 method.

4.4 Post-Remediation Media Monitoring and Sampling

Samples shall be collected from the monitoring well network, indoor air, and sub-slab vapor. Sampling locations, required analytical parameters and schedule are provided in the table below.

Table 4-3 – Post Remediation Sampling Requirements and Schedule

Sampling Location	Analytical Parameters			Schedule
	VOCs (EPA Method 8260C)	PAH (EPA Method 8270D)	VOC (EPA Method TO-15)	
Monitoring Well Network	X	X		Annually
Indoor Air			X	As directed by DEC/DOH, or as elected by the Volunteers
Sub-Slab Vapor			X	As directed by DEC/DOH, or as elected by the Volunteers

Modification to the frequency or sampling requirements will require approval from the NYSDEC. Detailed sample collection and analytical procedures and protocols are provided in Appendix E – Field Standard Operating Procedures and Appendix F – Quality Assurance Project Plan.

On-site monitoring wells are to be sampled via low-flow sampling techniques for the non-VOC fractions, and by three-volume purge for VOCs. Off-site monitoring wells (MW-6S and MW-6D) were may be sampled via the three-volume purge method. The samples are to be shipped to a certified laboratory and analyzed for VOCs and PAHs as indicated above. Purge water and IDW is to be drummed and contained on site for characterization and off-site disposal. It is anticipated there is adequate storage capacity with the SSDS fencing.

Two full rounds of groundwater sampling including all seven permanent monitoring wells were conducted on 31 January 2008 and 3 September 2010 via the three-volume purge method. The samples were sent to a certified laboratory and analyzed for VOCs via EPA Method 8260. The samples collected on 3 September 2010 were also analyzed for Polycyclic Aromatic Hydrocarbons (PAHs) via EPA Method 8270 SIM

As part of the routine operations described in 5.3.2, differential pressure will be measured at sub-slab sampling points quarterly. The collection of sub-slab vapor or indoor air samples in not anticipated while the SSDS is maintaining necessary coverage. However, as required by NYSDEC/NYSDOH sub slab and indoor air samples are to be collected in accordance with the most current version of the NYSDOH Guidance for Evaluating Soil Vapor Intrusion in the State of New York. It is anticipated that samples will be collected in Summa canisters.

4.4.1 Groundwater Sampling

Groundwater monitoring will be performed annually to assess the performance of the remedy. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

The network of monitoring wells has been installed to monitor upgradient, on-site and downgradient groundwater conditions at the site. The network of on-site and off-site wells has been designed based on the following criteria:

All existing wells will be sampled. Based upon a general southerly gradient, this well network provides adequate upgradient and downgradient conditions at property boundaries and immediately adjacent to historical AOCs. The two off-site wells provide a boundary condition beyond the property line. The sampling is part of the monitored natural attenuation (MNA) remedy following on-site source removal. Regular assessment of the effectives of the MNA will be addressed in the Periodic Performance Report using criteria found in Section 6.4C of DER-10.

Table 4-4 summarizes the wells identification number, as well as the purpose, location, depths, diameter and screened intervals of the wells. As part of the groundwater monitoring, 2 on-site AOC upgradient wells, 3 other on-site wells and 2 downgradient wells are sampled to evaluate the effectiveness of the remedial system. All wells are located in the unconfined Upper Glacial Aquifer. On-site groundwater levels measured over the course of the project provide the depth of the water table to be approximately 45 to 50 feet with flow toward the south-southeast. A map showing the locations of the wells is provided in Figure 2-4.

Table 4-4 – Monitoring Well Construction Details

Monitoring Well ID	Well Location	Coordinates (longitude/ latitude)	Well Diameter (inches)	Elevation (Feet above mean sea level)			
				Casing	Surface	Screen Top	Screen Bottom
MW-1	Down-gradient	40.744846° N, -73.622666° W	2	110.86	111.36	63.86	53.86
MW-02	Down-gradient	40.745474° N, -73.622116 W	2	112.11	112.61	65.11	55.11
MW-03	Upgradient	40.745719° N, -73.623105° W	2	112.23	112.73	65.23	55.23
MW-04	Upgradient	40.746116° N,	2	108.06	108.56	62.06	52.06

		-73.622332° W					
MW-05	Down-gradient	40.745165° N, -73.621972° W	2	112.07	112.57	65.07	55.07
MW-06S	Off-site and downgradient	40.742640° N -73.620869° W	2	107.03	107.883	32.33	22.33
MW-06D	Off-site and downgradient	40.742622° N, -73.620864° W	2	106.82	107.32	-8.18	-18.18

Monitoring well construction logs are included in Appendix C of this document.

If biofouling or silt accumulation occurs in the on-site and/or off-site monitoring wells, the wells will be physically agitated/surged and redeveloped. Additionally, monitoring wells will be properly decommissioned and replaced, if an event renders the wells unusable.

Repairs and/or replacement of wells in the monitoring well network will be performed based on assessments of structural integrity and overall performance.

The NYSDEC will be notified prior to any repair or decommissioning of any monitoring well for the purpose of replacement, and the repair or decommissioning and replacement process will be documented in the subsequent Periodic Review Report. Well decommissioning without replacement will be done only with the prior approval of the NYSDEC. Well abandonment will be performed in accordance with NYSDEC's guidance entitled "CP-43: Groundwater Monitoring Well Decommissioning Procedures." Monitoring wells that are decommissioned because they have been rendered unusable will be replaced in kind in the nearest available location, unless otherwise approved by the NYSDEC.

The sampling frequency may only be modified with the approval of the NYSDEC. This SMP will be modified to reflect changes in sampling plans approved by the NYSDEC.

Deliverables for the groundwater monitoring program are specified in Section 7.0 – Reporting Requirements.

4.4.2 Soil Vapor Intrusion Sampling

Soil vapor intrusion sampling will be performed by the Volunteers to assess the performance of the remedy. Modification to the frequency or sampling requirements will require approval from the NYSDEC.

The network of on-site soil vapor intrusion sample locations is the same as sampled historically and previously presented in Section 2.5.5. The sampling point network has been designed based on the following criteria:

- Covers entire footprint of the Site building
- Includes both closed office and open work floor
- Includes sub-slab and indoor air-couples

The sampling frequency may only be modified with the approval of the NYSDEC. This SMP will be modified to reflect changes in sampling plans approved by the NYSDEC.

Deliverables for the soil vapor intrusion sampling program are specified in Section 7.0 – Reporting Requirements.

4.4.3 Monitoring and Sampling Protocol

All sampling activities will be recorded in a field book and associated sampling log as provided in Appendix H - Site Management Forms. Other observations (e.g., groundwater monitoring well integrity, etc.) will be noted on the sampling log. The sampling log will serve as the inspection form for the monitoring network. Additional detail regarding monitoring and sampling protocols are provided in the site-specific Field Standard Operating Procedures provided as Appendix E of this document.

5.0 OPERATION AND MAINTENANCE PLAN

5.1 General

This Operation and Maintenance Plan provides a brief description of the measures necessary to operate, monitor and maintain the mechanical components of the remedy selected for the site. This Operation and Maintenance Plan:

- Includes the procedures necessary to allow individuals unfamiliar with the site to operate and maintain the SSDS;
- Will be updated periodically to reflect changes in site conditions or the manner in which the SSDS are operated and maintained.

Further detail regarding the Operation and Maintenance of the SSDS is provided in Appendix I - Operation and Maintenance Manual. A copy of the SSDS as-builts is provided in Figures 5-1, 5-2 and 5-3. A copy of this Operation and Maintenance Manual, along with the complete SMP, is to be maintained at the site. This Operation and Maintenance Plan is not to be used as a stand-alone document, but as a component document of this SMP.

5.2 Remedial System (or other Engineering Control) Performance Criteria

The performance criteria refer to the ability of the components of the system, including mechanical devices, to function as designed. The system currently operates at approximately 200 CFM from a central extraction point. The system is exempt from an air discharge permit based upon the calculated mass discharge. The performance objectives of the SSDS are as follows:

- As per the RAWP, depressurization will be maintained at all locations requiring mitigation. Vapor extraction at VEW-5 will continue until it is demonstrated to the NYSDEC that the system is no longer necessary based on indoor air and sub-slab soil vapor concentrations
- Design and/or operational modifications to achieve the required vacuum measurements, can include, but are not necessarily limited to, the following:

  - Flow controls at each extraction point can be adjusted to redirect subsurface gas flow and alter the system radius of influence;
  - Extraction well points and/or air vents can be closed off or operated in an alternating sequence;
  - The blower vacuum capacity can be increased to achieve desired radii of influence;
  - Additional air vents could be installed; and
  - Additional vapor extraction wells could be installed.
- Compliance with the substantive requirements for air emission limits as stipulated in Title 6 of the New York Code of Rules and Regulations and the DAR-1 guidance document must be achieved. Compliance with these aforementioned air emissions criteria will be demonstrated by collecting samples of outlet and analyzing for VOCs by EPA Method TO-15.
- The total soil vapor flow rate will also be measured and the mass emission rate of each chemical of concern will be calculated and compared to those shown in Table 5-1. The mass emission rate of each of these contaminants following emission controls should be less than that indicated in Table 5-1. The SSDS discharge currently does not require treatment based upon historic mass emission rates following the completion of the IRM and as approved by NYSDEC.
- Contaminants of concern include:
  - Tetrachloroethene (PCE);
  - Trichloroethene (TCE); and
  - Total 1,2-Dichloroethene (1,2 DCE).
- The final objective of the project is to mitigate soil gas VOC levels and protect against VOCs entering occupied buildings via soil gas intrusion. Acceptable indoor air concentrations are defined in the document entitled Final Guidance for Evaluating Soil Vapor Intrusion in the State of New York, (NYSDOH, October 2006; updated May 2017) and are given below:
  - Tetrachloroethene (30 $\mu g/m^3$);
  - Trichloroethene (2.0 $\mu g/m^3$); and
  - Total 1,2-Dichloroethene (no level established)

5.3 Operation and Maintenance of Sub-slab Depressurization System

The following sections provide a description of the operations and maintenance of the SSDS. Cut-sheets and as-built drawings for the SSDS are provided in Appendix I - Operations and Maintenance Manual.

.

5.3.1 System Start-Up and Testing

The system was adjusted to a single point SSDS in 2011 and communication testing was performed to determine the effectiveness of the modified sub-slab depressurization system. ERM conducted a radius of influence of negative pressure (vacuum) test beneath the building foundation slab within the area requiring mitigation. The desired negative pressure for each measuring point, as recommended by the NYSDOH, is minimum 0.001 inches w.c. when the building exhaust system is running.

Vacuum influence measurements were taken from one vacuum extraction well, four permanent sub-slab soil vapor sampling ports, and two air ventilation points on 8 March 2016. The table below provides the measurements taken from each of the monitoring points.

Table 5-2: SSDS Vacuum Influence Measurements – 8 March 2016

ID	Pressure ("WC)*
VEW-5	-37
JH-SS-01	0
JH-SS-02	-0.005
JH-SS-03	-0.007
JH-SS-04	-0.032
JH-SS-05	-0.162
AV-1	-0.255
AV-2	-0.376

*A negative pressure designates a vacuum.

These results demonstrate that a consistent sub-slab vacuum was obtained in the majority of the building. No influence was observed at monitoring point JH-SS-01 in March 2016. This was communicated to NYSDEC and NYSDOH in an email dated 24 May 2016. On 25 May 2016 ERM collected a soil gas sample from JH-SS-01, as directed by the State, to determine if soil gas impacts exist under this portion of the

building slab. The results of this sampling indicated that soil gas impacts are not present beneath this portion of the building and the NYSDOH agreed that no further action is required at JH-SS-01. ERM will continue to collect vacuum measurements at this sampling point during future monitoring events and record the influence readings. Additionally, as directed by NYSDOH in their email dated 9 June 2016, ERM will include JH-SS-01 as part of the future soil gas sampling required to evaluate whether the sub-slab depressurization system currently operating in the building can be permanently shut down.

The SSDS is currently in use, and has already undergone system start-up testing, and balancing. The system testing described below will be conducted if, in the course of the SSDS lifetime, significant changes are made to the system, and/or the system must be restarted:

1. Following start-up of the SSDS after a system modification, a representative sub-slab vapor sample will be collected from the SSDS effluent point (i.e., the blower exhaust) for a total of one sample. In Figure 5-3, the sample point is represented as SP308. The testing will be performed utilizing SUMMA® canisters and analyzing the samples for the VOCs via the USEPA TO-I5 method. See additional sampling details in Section 4.3. The results from the TO-15 analyses of the air from the effluent stack will be used to confirm that emissions controls are not required prior to discharge. Calculations will be performed using the NYSDEC Division of Air Resources 1 (DAR-1) Ambient Air Quality Impact Screening Analysis. This model will use concentrations of all VOCs measured during testing, and the discharge flow rates to calculate annual and short-term impacts, which will be compared to the DAR-1 Annual Guideline Concentrations, and Short-Term Guideline Concentrations, respectively.

2. Shortly after start-up of the SSDS, the sub-slab pressure at each monitoring point will be measured utilizing an appropriate hand-held manometer. If necessary, the applied vacuum at the suction points will be adjusted to achieve a minimum of 0.004 inches w.c. vacuum across the majority of the building. The objective will

be to obtain similar vacuum measurements to those shown above. The valves near each suction point will be utilized to balance the sub-slab pressure.

3. After achieving the maximum vacuum coverage as possible, smoke tests will be performed in the vicinity of SSD system modifications to identify any leaks through cracks in the building floor, floor joints, and suction points. Identified leaks will be resealed until smoke tests indicate that an appropriate seal of the floor slab has been achieved.

4. Any building operations equipment relying upon natural draft for exhaust of carbon monoxide and other combustion gases will be tested for back draft caused by the operation of the SSD system. Back draft poses a potential health concern because of carbon monoxide. Testing for back draft will entail utilizing a carbon monoxide meter to detect the presence of this compound in the air near exhausts for appliances. If necessary, any back draft caused by the SSD system will be corrected by sealing any leaks in the floor slab, as indicated above.

The system testing described above will be conducted if, in the course of the SSDS lifetime, the system goes down for an extended period or significant changes are made to the system and the system must be restarted.

5.3.2 Routine System Operation and Maintenance

Regular monitoring of the SSDS will be performed as part of the remedy. Until otherwise approved by NYSDEC/NYSDOH, quarterly visits will be performed to confirm that the system is operating as designed and will include measurement of the following parameters:

- System operating temperature;
- Vapor flow rates;
- Influent soil vapor concentrations (by PID);
- Exhaust gas concentrations (by PID);

- Runtime;
- Temperature readings at all gauges and at operational air vents;
- Pressure/vacuum readings at all gauges;
- Integrity of system piping;
- Any shutdown conditions and responses;
- Measurement of differential pressure at sub-slab sampling points.
- Quarterly collection of vapor samples for laboratory analysis (further detail is provided below).

As there is currently no vapor treatment, each vapor sampling event for laboratory analysis will include only one sample of emissions to the atmosphere. All samples will be collected using Summa Canisters and will be analyzed using EPA Method TO-15. Normal quarterly maintenance activities will include the following:

- Leak detection and repair; and
- All maintenance items listed in manufacturer equipment recommendations.

Upon review of the quarterly system data, the operator will make the appropriate adjustments to the system to optimize performance. If any equipment readings are not within their typical range, any equipment is observed to be malfunctioning, or the system is not performing within specifications as indicated in the Operating Log, maintenance and repair as per the Operation and Maintenance Plan are required immediately, and the SSDS must be restarted.

Finally, annual progress reports, including compliance sample results and operational data will be submitted to NYSDEC.

5.3.3 Non-Routine Operation and Maintenance

A zero vacuum will indicate an obstruction or break in the piping, or a blower failure. Any damaged parts or a damaged blower will have to be replaced immediately.

Disconnect and leave the damaged blower off until it is replaced or parts are replaced and contact the Project Manager for the remaining steps. Once corrected, the system should be restarted and vacuum measurements collected to ensure vacuum coverage is achieved similar to that noted in Section 5.3.1 Section 4.3 provides a summary and schedule of routine maintenance.

5.3.4 System Monitoring Devices and Alarms

The SSDS control system has a relay control logic board that operates the blower continuously and contains interlocks for emergency system shutdown designed to protect the equipment and to ensure personnel safety. These controls and the resulting actions are summarized in Appendix J.

The SSDS system has an autodialer warning devices to indicate that the system is not operating properly. In the event that warning device is activated, applicable maintenance and repairs will be conducted, as specified in the Operation and Maintenance Plan, and the SSDS system will be restarted. Operational problems will be noted in the Periodic Review Report to be prepared for that reporting period.

6.0 PERIODIC ASSESSMENTS/EVALUATIONS

6.1 Climate Change Vulnerability Assessment

Increases in both the severity and frequency of storms/weather events, an increase in sea level elevations along with accompanying flooding impacts, shifting precipitation patterns and wide temperature fluctuation, resulting from global climactic change and instability, have the potential to significantly impact the performance, effectiveness and protectiveness of a given site and associated remedial systems. Vulnerability assessments provide information so that the site and associated remedial systems are prepared for the impacts of the increasing frequency and intensity of severe storms/weather events and associated flooding.

This section provides a summary of vulnerability assessments that will be conducted for the site during periodic assessments, and briefly summarizes the vulnerability of the site and/or engineering controls to severe storms/weather events and associated flooding.

A preliminary assessment of potential vulnerabilities is discussed below and is to be updated as part of the periodic reviews:

- Flood Plain: According the FIRM Map 36059C0226G the site is not within a current flood plain. The site is also not low-lowing or in a low groundwater recharge area.
- Site Drainage and Storm Water Management: Surface water runoff is directed to on site dry wells and recharge basin. The storm water management system has proven to have adequate capacity during severe rain events. The site topography dips to the south and no areas are anticipated for flooding.
- Erosion: The site has continuous vegetative or impermeable cover and no erosion has been reported at the site.

- High Wind: The site contains a one story building. It is not considered to be vulnerable to damage from high winds.
- Electricity: The SSDS does not have a backup power system in the event from a power loss. However it is equipped with an emergency auto-dialer will call out to personal that can coordinate an appropriate response.
- Spill/Contaminant Release: Drums of non-hazardous purge water may be on site following groundwater sampling events. However the vulnerability for a spill is not increased due to climate change concerns above.

6.2 Green Remediation Evaluation

NYSDEC's DER-31 Green Remediation requires that green remediation concepts and techniques be considered during all stages of the remedial program including site management, with the goal of improving the sustainability of the cleanup and summarizing the net environmental benefit of any implemented green technology. This section of the SMP provides a summary of any green remediation evaluations to be completed for the site during site management, and as reported in the Periodic Review Report (PRR).

A preliminary assessment of Green Remediation concerns is discussed below: and is to be updated as part of the periodic reviews:

- Waste Generation: Several drums of IDW and purge water will be generated during groundwater sampling event every 5th quarter. Previously samples were collected via the three volume method; however a volume reduction may be realized through universal low flow sampling.

- Energy usage: Anticipated continuous electrical usage is required for operation of the SSDS. Annual SVI sampling will be conducted to ensure this system can be powered down and decommissioned at the earliest possible date.

- Emissions: Vapors will be released to the atmosphere through the operation of the SSDS. However the mass discharge is low enough to not require permitting or emission controls. Likewise, implementing treatment of the vapors will

increase waste generation and emissions through delivery, disposal and/or regeneration. Limited fuel will be used regular site inspections and monitoring.

- Water usage: Limited decontaminated water will be used during groundwater sampling events and is considered *de Minimis*. Water will be distilled and provided by the laboratory.

- Land and/or ecosystems: The remedy restores more land at the site for commercial or industrial development.

6.2.1 Timing of Green Remediation Evaluations

For major remedial system components, green remediation evaluations and corresponding modifications will be undertaken as part of a formal Remedial System Optimization (RSO), or at any time that the Project Manager feels appropriate, e.g. during significant maintenance events or in conjunction with storm recovery activities.

Modifications resulting from green remediation evaluations will be routinely implemented and scheduled to occur during planned/routine operation and maintenance activities. Reporting of these modifications will be presented in the PRR.

6.2.2. Remedial Systems

Remedial systems will be operated properly considering the current site conditions to conserve materials and resources to the greatest extent possible. Consideration will be given to operating rates and use of reagents and consumables. Spent materials will be sent for recycling, as appropriate. When the current equipment needs a replacement lower energy equivalents will be considered.

6.2.4 Frequency of System Checks, Sampling and Other Periodic Activities

Transportation to and from the site and use of consumables in relation to visiting the site in order to conduct system checks and or collect samples and shipping samples to a laboratory for analyses have direct and/or inherent energy costs. The schedule and/or means of these periodic activities have been prepared so that these tasks can be accomplished in a manner that does not impact remedy protectiveness but reduces expenditure of energy or resources. Based upon SSDS performance the potential for less frequent inspections and sampling are to be considered. Inspection and sampling events will be combined to the extent practicable.

6.2.5 Metrics and Reporting

As discussed in Section 7.0 and as shown in Appendix H – Site Management Forms, information on energy usage, solid waste generation, transportation and shipping, water usage and land use and ecosystems will be recorded to facilitate and document consistent implementation of green remediation during site management and to identify corresponding benefits.

6.3 Remedial System Optimization

A Remedial Site Optimization (RSO) study will be conducted any time that the NYSDEC or the Volunteers request in writing that an in-depth evaluation of the remedy is needed. An RSO may be appropriate if any of the following occur:

- The remedial actions have not met or are not expected to meet RAOs in the time frame estimated in the Decision Document;
- The management and operation of the remedial system is exceeding the estimated costs;
- The remedial system is not performing as expected or as designed;
- Previously unidentified source material may be suspected;

- Plume shift has potentially occurred;
- Site conditions change due to development, change of use, change in groundwater use, etc.;
- There is an anticipated transfer of the site management to another remedial party or agency; and
- A new and applicable remedial technology becomes available.

An RSO will provide a critique of a site's conceptual model, give a summary of past performance, document current cleanup practices, summarize progress made toward the site's cleanup goals, gather additional performance or media specific data and information and provide recommendations for improvements to enhance the ability of the present system to reach RAOs or to provide a basis for changing the remedial strategy.

The RSO study will focuses on overall site cleanup strategy, process optimization and management with the intent of identifying impediments to cleanup and improvements to site operations to increase efficiency, cost effectiveness and remedial time frames. Green remediation technology and principals are to be considered when performing the RSO.

7.0. REPORTING REQUIREMENTS

7.1 Site Management Reports

All site management inspection, maintenance and monitoring events will be recorded on the appropriate site management forms provided in Appendix H. These forms are subject to NYSDEC revision.

All applicable inspection forms and other records, including media sampling data and system maintenance reports, generated for the site during the reporting period will be provided in electronic format to the NYSDEC in accordance with the requirements of the table below and summarized in the Periodic Review Report.

Table 7-1: Schedule of Interim Monitoring/Inspection Reports

Task/Report	Reporting Frequency*
SVE Inspection Report	Quarterly visits will be documented annually
Periodic Review Report	Annually, or as otherwise determined by the Department

* The frequency of events will be conducted as specified until otherwise approved by the NYSDEC.

All interim monitoring/inspections reports will include, at a minimum:

- Date of event or reporting period;
- Name, company, and position of person(s) conducting monitoring/inspection activities;
- Description of the activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet);
- Type of samples collected (e.g., sub-slab vapor, indoor air, outdoor air, etc);

- Copies of all field forms completed (e.g., well sampling logs, chain-of-custody documentation, etc.);
- Sampling results in comparison to appropriate standards/criteria;
- A figure illustrating sample type and sampling locations;
- Copies of all laboratory data sheets and the required laboratory data deliverables required for all points sampled (to be submitted electronically in the NYSDEC-identified format);
- Any observations, conclusions, or recommendations; and
- A determination as to whether contaminant conditions have changed since the last reporting event.

Routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting maintenance activities;
- Description of maintenance activities performed;
- Any modifications to the system;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet); and,
- Other documentation such as copies of invoices for maintenance work, receipts for replacement equipment, etc., (attached to the checklist/form).

Non-routine maintenance event reporting forms will include, at a minimum:

- Date of event;
- Name, company, and position of person(s) conducting non-routine maintenance/repair activities;
- Description of non-routine activities performed;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet); and

- Other documentation such as copies of invoices for repair work, receipts for replacement equipment, etc. (attached to the checklist/form).

Data will be reported in digital format as determined by the NYSDEC. Currently, data is to be supplied electronically and submitted to the NYSDEC EQuIS^{TM} database in accordance with the requirements found at this link http://www.dec.ny.gov/chemical/62440.html.

7.2 Periodic Review Report

A Periodic Review Report (PRR) will be submitted to the Department beginning sixteen (16) months after the Certificate of Completion or equivalent document e.g., Satisfactory Completion Letter, No Further Action Letter, etc. is issued. After submittal of the initial Periodic Review Report, the next PRR shall be submitted annually to the Department or at another frequency as may be required by the Department. In the event that the site is subdivided into separate parcels with different ownership, a single Periodic Review Report will be prepared that addresses the site described in Appendix A - Declaration of Covenants and Restrictions. The report will be prepared in accordance with NYSDEC's DER-10 and submitted within 30 days of the end of each certification period. Media sampling results will also be incorporated into the Periodic Review Report. The report will include:

- Identification, assessment and certification of all ECs/ICs required by the remedy for the site.

- Results of the required annual site inspections and severe condition inspections, if applicable.

- All applicable site management forms and other records generated for the site during the reporting period in the NYSDEC-approved electronic format, if not previously submitted.

- A summary of any discharge monitoring data and/or information generated during the reporting period, with comments and conclusions.

- Data summary tables and graphical representations of contaminants of concern by media (groundwater, soil vapor, etc.), which include a listing of all compounds analyzed, along with the applicable standards, with all exceedances highlighted. These will include a presentation of past data as part of an evaluation of contaminant concentration trends.

- Results of all analyses, copies of all laboratory data sheets, and the required laboratory data deliverables for all samples collected during the reporting period will be submitted in digital format as determined by the NYSDEC. Currently, data is supplied electronically and submitted to the NYSDEC EQuIS^{TM} database in accordance with the requirements found at this link: http://www.dec.ny.gov/chemical/62440.html.

- A site evaluation, which includes the following:

  - The compliance of the remedy with the requirements of the site-specific RAWP, ROD or Decision Document;

  - The operation and the effectiveness of all treatment units, etc., including identification of any needed repairs or modifications;

  - Any new conclusions or observations regarding site contamination based on inspections or data generated by the Monitoring and Sampling Plan for the media being monitored;

  - Recommendations regarding any necessary changes to the remedy and/or Monitoring and Sampling Plan; and

  - Trends in contaminant levels in the affected media will be evaluated to determine if the remedy continues to be effective in achieving remedial goals as specified by the Decision Document.

  - The overall performance and effectiveness of the remedy.

- A performance summary for all treatment systems at the site during the calendar year, including information such as:

  - The number of days the system operated for the reporting period;
  - The average flow per day;
  - The contaminant mass removed;
  - A description of breakdowns and/or repairs along with an explanation for any significant downtime;
  - A description of the resolution of performance problems;
  - Alarm conditions;
  - Trends in equipment failure;
  - A summary of the performance, effluent and/or effectiveness monitoring; and
  - Comments, conclusions, and recommendations based on data evaluation.

7.2.1 Certification of Institutional and Engineering Controls

Following the last inspection of the reporting period, a Professional Engineer licensed to practice in New York State will prepare, and include in the Periodic Review Report, the following certification as per the requirements of NYSDEC DER-10:

"*For each institutional or engineering control identified for the site, I certify that all of the following statements are true:*

- *The inspection of the site to confirm the effectiveness of the institutional and engineering controls required by the remedial program was performed under my direction;*
- *The institutional control and/or engineering control employed at this site is unchanged from the date the control was put in place, or last approved by the Department;*

- *Nothing has occurred that would impair the ability of the control to protect the public health and environment;*
- *Nothing has occurred that would constitute a violation or failure to comply with any site management plan for this control;*
- *Access to the site will continue to be provided to the Department to evaluate the remedy, including access to evaluate the continued maintenance of this control;*
- *If a financial assurance mechanism is required under the oversight document for the site, the mechanism remains valid and sufficient for the intended purpose under the document;*
- *Use of the site is compliant with the Declaration of Covenants and Restrictions;*
- *The engineering control systems are performing as designed and are effective;*
- *To the best of my knowledge and belief, the work and conclusions described in this certification are in accordance with the requirements of the site remedial program and generally accepted engineering practices; and*
- *The information presented in this report is accurate and complete.*

I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class "A" misdemeanor, pursuant to Section 210.45 of the Penal Law. I, Stephen A. Mirabello, of 105 Maxess Road, Melville, New York *, am certifying as Owner's/Remedial Party's Designated Site Representative*:

The signed certification will be included in the Periodic Review Report.

The Periodic Review Report will be submitted, in electronic format, to the NYSDEC Central Office, Regional Office in which the site is located and the NYSDOH Bureau of

Environmental Exposure Investigation. The Periodic Review Report may need to be submitted in hard-copy format, as requested by the NYSDEC project manager.

7.3 Corrective Measures Work Plan

If any component of the remedy is found to have failed, or if the periodic certification cannot be provided due to the failure of an institutional or engineering control, a Corrective Measures Work Plan will be submitted to the NYSDEC for approval. This plan will explain the failure and provide the details and schedule for performing work necessary to correct the failure. Unless an emergency condition exists, no work will be performed pursuant to the Corrective Measures Work Plan until it has been approved by the NYSDEC.

7.4 Remedial Site Optimization Report

In the event that an RSO is to be performed (see Section 6.3, upon completion of an RSO, an RSO report must be submitted to the Department for approval. A general outline for the RSO report is provided in Appendix J. The RSO report will document the research/ investigation and data gathering that was conducted, evaluate the results and facts obtained, present a revised conceptual site model and present recommendations. RSO recommendations are to be implemented upon approval from the NYSDEC. Additional work plans, design documents, HASPs etc., may still be required to implement the recommendations, based upon the actions that need to be taken. A final engineering report and update to the SMP may also be required.

The RSO report will be submitted, in electronic format, to the NYSDEC Central Office, Regional Office in which the site is located, Site Control and the NYSDOH Bureau of Environmental Exposure Investigation.

8.0 REFERENCES

6NYCRR Part 375, Environmental Remediation Programs. December 14, 2006.

NYSDEC DER-10 – "Technical Guidance for Site Investigation and Remediation".

NYSDEC, 1998. Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations Division of Water Technical and Operational Guidance Series (TOGS) 1.1.1. June 1998 (April 2000 addendum).

ERM, July 2006. Engineering Report – Soil Vapor Extraction System

ERM, 27 August 2012. Construction Completion Report for AOC 7

ERM, October 2011. Remedial Investigation Report

ERM, January 2014. Remedial Investigation Report Addendum No. 1

ERM, 1 December 2016. Remedial Action Work Plan

Table 2-3
Contamination Remaining at Site Above Unrestricted Soil Cleanup Objectives
40 Voice Road, Carle Place, New York

CONSTITUENT	6NYCRR PART 375 Unrestricted SCO	AOC-04J-EW JC52892-2 10/11/2017	BG-01 E0376-08 3/28/2006	BG-02 E0376-09 3/28/2006	NT-2 168974-03 1/3/1997	S-1 70240356-01 1/22/1997	S-3 70240356-03 1/22/1997	SB-38 JA79660-6 6/28/2011	SB-38 JA79660-7 6/28/2011	ST-1 168974-01 1/3/1997	SWCB-02 G0700-04 5/8/2008	SWCB-03 G0700-21 5/9/2008
Starting Depth (feet)		1.5	0	0	5.5	NA	NA	16	20	5.5	19	29
Ending Depth (feet)		2	1	1	6	NA	NA	16.5	20.5	6	20	30
PAHs (ug/kg)												
Benzo(a)anthracene	1000										13000	
Benzo(a)pyrene	1000										11000	
Benzo(b)fluoranthene	1000	1210	1400								19000	1200
Benzo(k)fluoranthene	800										6600	
Chrysene	1000		1100								14000	
Dibenzo(a,h)anthracene	330										2400	
Indeno(1,2,3-cd)pyrene	500	505	610								7800	560
VOCs (ug/kg)												
Acetone	50							226	517			
Pesticides/PCBs (ug/kg)												
alpha-Chlordane	94		300	230								
Total PCBs	100		1800									
Metals (mg/kg)												
Arsenic	13			18.7								
Cadmium	2.5						5.8					
Chromium	30				35.7	142						
Lead	63						255					
Mercury	0.18		0.39	0.24			0.2			0.89		

See the Endnotes at the end of this table.

Table 5-1a
SVE Emissions Analysis - June 2011
Johnson & Hoffman Manufacturing Facility, Carle Place, New York

Point Source Method - Conservative Approach

Use this method only if the stack height to building height ratio is less than 1.5 (no credit given for plume rise rise due to buoyancy or momentum).

Emission Point	EP-1
h_e - stack height (ft)	30
Air flow rate (scfm)	152

Building Height = 25 feet h_e/h_b = 1.2 Ratio < 1.5 = OK

Contaminant	Extracted Soil Vapor Concentration (ug/m^3) [1]	Q (lb/hr)	Q_a (lb/yr)	C_a (ug/m^3)	C_p (ug/m^3)	C_{st} (ug/m^3)	DAR-1 Values AGC (ug/m^3)	DAR-1 Values SGC (ug/m^3)	AGC Exceeded?	SGC Exceeded?
Vinyl chloride (VC)	**0.77**	4.38E-07	0.004	0.00001	0.00001	0.001	0.11	180,000	No	No
Tetrachloroethene (PCE)	**5460**	3.11E-03	27.227	0.07756	0.07747	5.036	1	1,000	No	No
Trichloroethene (TCE)	**282**	1.61E-04	1.406	0.00401	0.00400	0.260	0.5	14,000	No	No
cis-1,2-Dichloroethene (DCE)	**468**	2.66E-04	2.334	0.00665	0.00664	0.432	63	None	No	No
Isopropyl alcohol (IPA)	**0.66**	3.76E-07	0.003	0.00001	0.00001	0.001	7000	98,000	No	No
Dichlorodifluoromethane (Freon 12)	**2.80**	1.59E-06	0.014	0.00004	0.00004	0.003	12000	None	No	No
Ethanol	**3.60**	2.05E-06	0.018	0.00005	0.00005	0.003	45000	None	No	No
Acetone	**5.00**	2.85E-06	0.025	0.00007	0.00007	0.005	30000	180,000	No	No
Carbon Disulfide	**0.65**	3.70E-07	0.003	0.00001	0.00001	0.001	700	6,200	No	No
Methylene Chloride	**1.40**	7.97E-07	0.007	0.00002	0.00002	0.001	2.1	14,000	No	No
trans-1,2-Dichloroethene	**4.00**	2.28E-06	0.020	0.00006	0.00006	0.004	63	None	No	No
Hexane	**0.42**	2.39E-07	0.002	0.00001	0.00001	0.000	700	None	No	No
1,1-Dichloroethane	**1.70**	9.68E-07	0.008	0.00002	0.00002	0.002	0.630	None	No	No
2-Butanone (Methyl Ethyl Ketone)	**13**	7.40E-06	0.065	0.00018	0.00018	0.012	5000	13,000	No	No
Tetrahydrofuran	**2.60**	1.48E-06	0.013	0.00004	0.00004	0.002	350	30,000	No	No
1,1,1-Trichloroethane	**4.20**	2.39E-06	0.021	0.00006	0.00006	0.004	5000	9,000	No	No
Toluene	**2.00**	1.14E-06	0.010	0.00003	0.00003	0.002	5000	37,000	No	No
Chloromethane	**0.43**	2.45E-07	0.002	0.00001	0.00001	0.000	90	22,000	No	No
Trichlorofluoromethane	**3.20**	1.82E-06	0.016	0.00005	0.00005	0.003	5000	9,000	No	No
Chloroform	**4.40**	2.50E-06	0.022	0.00006	0.00006	0.004	0.043	150	No	No
Carbon Tetrachloride	**0.69**	3.93E-07	0.003	0.00001	0.00001	0.001	0.17	1,900	No	No
1,1-Dichloroethene	**1.00**	5.69E-07	0.005	0.00001	0.00001	0.001	70	None	No	No
p-Dichlorobenzene	**0.90**	5.12E-07	0.004	0.00001	0.00001	0.001	0.09	None	No	No
Ethylbenzene	**0.61**	3.47E-07	0.003	0.00001	0.00001	0.001	1000	54,000	No	No
1,2,4-Trimethylbenzene	**0.59**	3.36E-07	0.003	0.00001	0.00001	0.001	6	None	No	No
Xylenes (total)	**2.70**	1.54E-06	0.013	0.00004	0.00004	0.002	100	4,300	No	No

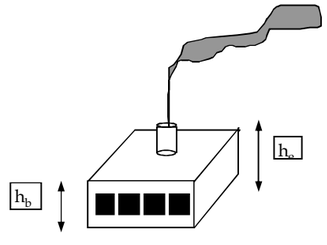
[1] VOC concentrations at outlet of SVE blower on 24 June 2011 prior to any treatment.

Equations Used:

Maximum Actual Annual Impact
C_a (ug/m^3) = $(6.0*Q_a)/(h_e^{2.25})$
where Q_a is in lbs/yr and h_e is in feet

Maximum Potential Annual Impact
C_p (ug/m^3) = $(52500*Q)/(h_e^{2.25})$
where Q is lbs/hr and h_e is in feet

Maximum Short Term Impact
C_{st} (ug/m^3) = C_p * 65



Mass flow
Q = (C)(air flow in ft^3/min)(1 m^3/ 35.32 ft^3)(1 g/1,000,000 ug)(1 lb/453.6 g)(60 min/hr) where Q is in lb/hr and C is in ug/m^3
Q_a = (Q)(8760hr/yr); where Q_a is in lb/yr

Table 5-1b
SVE Emissions Analysis - September 2011
Johnson & Hoffman Manufacturing Facility, Carle Place, New York

Point Source Method - Conservative Approach

Use this method only if the stack height to building height ratio is less than 1.5 (no credit given for plume rise rise due to buoyancy or momentum).

Emission Point	EP-1
h_e - stack height (ft)	30
Air flow rate (scfm)	181

Building Height = 25 feet h_e/h_b = 1.2 Ratio < 1.5 = OK

Contaminant	Extracted Soil Vapor Concentration (ug/m^3) [1]	Q (lb/hr)	Q_a (lb/yr)	C_a (ug/m^3)	C_p (ug/m^3)	C_{st} (ug/m^3)	DAR-1 Values AGC (ug/m^3)	DAR-1 Values SGC (ug/m^3)	AGC Exceeded?	SGC Exceeded?
Vinyl chloride (VC)		0.00E+00	0.000	0.00000	0.00000	0.000	0.11	180,000	No	No
Tetrachloroethene (PCE)	**3330**	2.26E-03	19.774	0.05633	0.05626	3.657	1	1,000	No	No
Trichloroethene (TCE)	**159**	1.08E-04	0.944	0.00269	0.00269	0.175	0.5	14,000	No	No
cis-1,2-Dichloroethene (DCE)	**277**	1.88E-04	1.645	0.00469	0.00468	0.304	63	None	No	No
Isopropyl alcohol (IPA)	**2.9**	1.97E-06	0.017	0.00005	0.00005	0.003	7000	98,000	No	No
Dichlorodifluoromethane (Freon 12)	**2.5**	1.69E-06	0.015	0.00004	0.00004	0.003	12000	None	No	No
Ethanol	**12.0**	8.13E-06	0.071	0.00020	0.00020	0.013	45000	None	No	No
Acetone	**17.0**	1.15E-05	0.101	0.00029	0.00029	0.019	30000	180,000	No	No
Propylene	**1.9**	1.29E-06	0.011	0.00003	0.00003	0.002	3000	None	No	No
Tertiary Butyl Alcohol	**1.8**	1.22E-06	0.011	0.00003	0.00003	0.002	720	None	No	No
trans-1,2-Dichloroethene	**2.7**	1.83E-06	0.016	0.00005	0.00005	0.003	63	None	No	No
2-Butanone (Methyl Ethyl Ketone)	**3.2**	2.17E-06	0.019	0.00005	0.00005	0.004	5000	13,000	No	No
1,1,1-Trichloroethane	**2.7**	1.83E-06	0.016	0.00005	0.00005	0.003	5000	9,000	No	No
Chloromethane	**0.9**	5.76E-07	0.005	0.00001	0.00001	0.001	90	22,000	No	No
Trichlorofluoromethane	**2.2**	1.49E-06	0.013	0.00004	0.00004	0.002	5000	9,000	No	No
Chloroform	**2.3**	1.56E-06	0.014	0.00004	0.00004	0.003	0.043	150	No	No

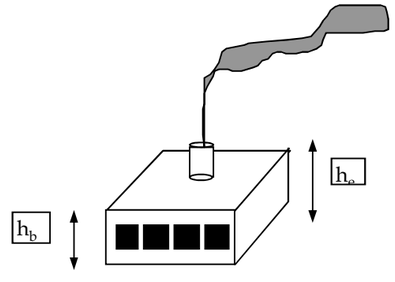
[1] VOC concentrations at outlet of SVE blower on 28 September 2011 prior to any treatment.

Equations Used:

Maximum Actual Annual Impact
C_a (ug/m^3) = $(6.0*Q_a)/(h_e^{2.25})$
where Q_a is in lbs/yr and h_e is in feet

Maximum Potential Annual Impact
C_p (ug/m^3) = $(52500*Q)/(h_e^{2.25})$
where Q is lbs/hr and h_e is in feet

Maximum Short Term Impact
C_{st} (ug/m^3) = C_p * 65



Mass flow
Q = (C)(air flow in ft^3/min)(1 m^3/ 35.32 ft^3)(1 g/1,000,000 ug)(1 lb/453.6 g)(60 min/hr) where Q is in lb/hr and C is in ug/m^3
Q_a = (Q)(8760hr/yr); where Q_a is in lb/yr

Table 5-1c
SVE Emissions Analysis - December 2011
Johnson & Hoffman Manufacturing Facility, Carle Place, New York

Point Source Method - Conservative Approach

Use this method only if the stack height to building height ratio is less than 1.5 (no credit given for plume rise rise due to buoyancy or momentum).

Emission Point	EP-1
h_e - stack height (ft)	30
Air flow rate (scfm)	186

Building Height = 25 feet h_e/h_b = 1.2 Ratio < 1.5 = OK

Contaminant	Extracted Soil Vapor Concentration (ug/m^3) [1]	Q (lb/hr)	Q_a (lb/yr)	C_a (ug/m^3)	C_p (ug/m^3)	C_{st} (ug/m^3)	DAR-1 Values AGC (ug/m^3)	DAR-1 Values SGC (ug/m^3)	AGC Exceeded?	SGC Exceeded?
Tetrachloroethene (PCE)	**3780**	2.63E-03	23.066	0.06570	0.06563	4.266	1	1,000	No	No
Trichloroethene (TCE)	**188**	1.31E-04	1.147	0.00327	0.00326	0.212	0.5	14,000	No	No
cis-1,2-Dichloroethene (DCE)	**262**	1.83E-04	1.599	0.00455	0.00455	0.296	63	None	No	No
Isopropyl alcohol (IPA)	**1.5**	1.04E-06	0.009	0.00003	0.00003	0.002	7000	98,000	No	No
Dichlorodifluoromethane (Freon 12)	**4.0**	2.79E-06	0.024	0.00007	0.00007	0.005	12000	None	No	No
Ethanol	**13.0**	9.06E-06	0.079	0.00023	0.00023	0.015	45000	None	No	No
Acetone	**13.0**	9.06E-06	0.079	0.00023	0.00023	0.015	30000	180,000	No	No
Methylene Chloride	**9.4**	6.55E-06	0.057	0.00016	0.00016	0.011	2.1	14,000	No	No
trans-1,2-Dichloroethene	**3.2**	2.23E-06	0.020	0.00006	0.00006	0.004	63	None	No	No
1,1-Dichloroethane	**2.5**	1.74E-06	0.015	0.00004	0.00004	0.003	0.630	None	No	No
2-Butanone (Methyl Ethyl Ketone)	**1.9**	1.32E-06	0.012	0.00003	0.00003	0.002	5000	13,000	No	No
Trichlorofluoromethane	**3.6**	2.51E-06	0.022	0.00006	0.00006	0.004	5000	9,000	No	No
Chloroform	**4.2**	2.93E-06	0.026	0.00007	0.00007	0.005	0.043	150	No	No

[1] VOC concentrations at outlet of SVE blower on 15 December 2011 prior to any treatment.

Equations Used:

Maximum Actual Annual Impact
C_a (ug/m^3) = $(6.0*Q_a)/(h_e^{2.25})$
where Q_a is in lbs/yr and h_e is in feet

Maximum Potential Annual Impact
C_p (ug/m^3) = $(52500*Q)/(h_e^{2.25})$
where Q is lbs/hr and h_e is in feet

Maximum Short Term Impact
C_{st} (ug/m^3) = C_p * 65

Mass flow
Q = (C)(air flow in ft^3/min)(1 m^3/ 35.32 ft^3)(1 g/1,000,000 ug)(1 lb/453.6 g)(60 min/hr) where Q is in lb/hr and C is in ug/m^3
Q_a = (Q)(8760hr/yr); where Q_a is in lb/yr

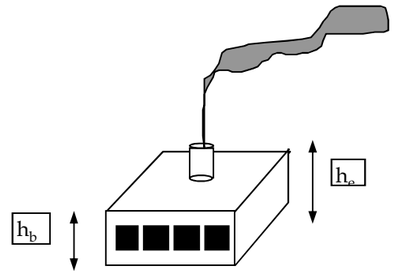


Table 5-1d
SVE Emissions Analysis - March 2012
Johnson & Hoffman Manufacturing Facility, Carle Place, New York

Point Source Method - Conservative Approach

Use this method only if the stack height to building height ratio is less than 1.5 (no credit given for plume rise rise due to buoyancy or momentum).

Emission Point	EP-1
h_e - stack height (ft)	30
Air flow rate (scfm)	183

Building Height = 25 feet h_e/h_b = 1.2 Ratio < 1.5 = OK

Contaminant	Extracted Soil Vapor Concentration (ug/m^3) [1]	Q (lb/hr)	Q_a (lb/yr)	C_a (ug/m^3)	C_p (ug/m^3)	C_{st} (ug/m^3)	DAR-1 Values AGC (ug/m^3)	DAR-1 Values SGC (ug/m^3)	AGC Exceeded?	SGC Exceeded?
Vinyl chloride (VC)	**0.66**	4.52E-07	0.004	0.00001	0.00001	0.001	0.11	180,000	No	No
Tetrachloroethene (PCE)	**2600**	1.78E-03	15.609	0.04446	0.04441	2.887	1	1,000	No	No
Trichloroethene (TCE)	**87**	5.97E-05	0.523	0.00149	0.00149	0.097	0.5	14,000	No	No
cis-1,2-Dichloroethene (DCE)	**275**	1.88E-04	1.651	0.00470	0.00470	0.305	63	None	No	No
Isopropyl alcohol (IPA)	**2.7**	1.85E-06	0.016	0.00005	0.00005	0.003	7000	98,000	No	No
Dichlorodifluoromethane (Freon 12)	**3.1**	2.12E-06	0.019	0.00005	0.00005	0.003	12000	None	No	No
Ethanol	**171**	1.17E-04	1.027	0.00292	0.00292	0.190	45000	None	No	No
Acetone	**28.7**	1.97E-05	0.172	0.00049	0.00049	0.032	30000	180,000	No	No
Benzene	**0.32**	2.19E-07	0.002	0.00001	0.00001	0.000	0.13	1,300	No	No
Methylene Chloride	**0.87**	5.96E-07	0.005	0.00001	0.00001	0.001	2.1	14,000	No	No
trans-1,2-Dichloroethene	**1.90**	1.30E-06	0.011	0.00003	0.00003	0.002	63	None	No	No
2-Hexanone	**0.70**	4.80E-07	0.004	0.00001	0.00001	0.001	30	4,000	No	No
Methyl Isobutyl Ketone	**0.61**	4.18E-07	0.004	0.00001	0.00001	0.001	3,000	31,000	No	No
2-Butanone (Methyl Ethyl Ketone)	**2.70**	1.85E-06	0.016	0.00005	0.00005	0.003	5000	13,000	No	No
Tetrahydrofuran	**0.97**	6.65E-07	0.006	0.00002	0.00002	0.001	350	30,000	No	No
1,1,1-Trichloroethane	**0.76**	5.21E-07	0.005	0.00001	0.00001	0.001	5000	9,000	No	No
Toluene	**1.10**	7.54E-07	0.007	0.00002	0.00002	0.001	5000	37,000	No	No
Chloromethane	**0.83**	5.69E-07	0.005	0.00001	0.00001	0.001	90	22,000	No	No
Trichlorofluoromethane	**2.20**	1.51E-06	0.013	0.00004	0.00004	0.002	5000	9,000	No	No
Chloroform	**0.63**	4.32E-07	0.004	0.00001	0.00001	0.001	0.043	150	No	No
Tertiary Butyl Alcohol	**0.45**	3.08E-07	0.003	0.00001	0.00001	0.000	720	None	No	No
1,2,4-Trimethylbenzene	**0.59**	4.04E-07	0.004	0.00001	0.00001	0.001	6	None	No	No
Xylenes (total)	**0.61**	4.18E-07	0.004	0.00001	0.00001	0.001	100	4,300	No	No

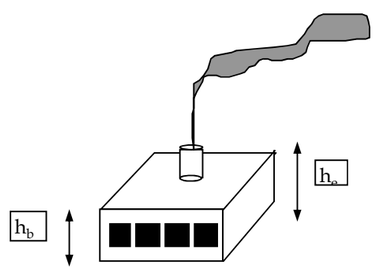
[1] VOC concentrations at outlet of SVE blower on 22 March 2012 prior to any treatment.

Equations Used:

Maximum Actual Annual Impact
C_a (ug/m^3) = $(6.0*Q_a)/(h_e^{2.25})$
where Q_a is in lbs/yr and h_e is in feet

Maximum Potential Annual Impact
C_p (ug/m^3) = $(52500*Q)/(h_e^{2.25})$
where Q is lbs/hr and h_e is in feet

Maximum Short Term Impact
C_{st} (ug/m^3) = C_p * 65



Mass flow
Q = (C)(air flow in ft^3/min)(1 m^3/ 35.32 ft^3)(1 g/1,000,000 ug)(1 lb/453.6 g)(60 min/hr) where Q is in lb/hr and C is in ug/m^3
Q_a = (Q)(8760hr/yr); where Q_a is in lb/yr

Table 5-1e
SVE Emissions Analysis - June 2012
Johnson & Hoffman Manufacturing Facility, Carle Place, New York

Point Source Method - Conservative Approach

Use this method only if the stack height to building height ratio is less than 1.5 (no credit given for plume rise rise due to buoyancy or momentum).

Emission Point	EP-1
h_e - stack height (ft)	30
Air flow rate (scfm)	183

Building Height = 25 feet h_e/h_b = 1.2 Ratio < 1.5 = OK

Contaminant	Extracted Soil Vapor Concentration (ug/m^3) [1]	Q (lb/hr)	Q_a (lb/yr)	C_a (ug/m^3)	C_p (ug/m^3)	C_{st} (ug/m^3)	DAR-1 Values AGC (ug/m^3)	DAR-1 Values SGC (ug/m^3)	AGC Exceeded?	SGC Exceeded?
Vinyl chloride (VC)	**0.43**	2.95E-07	0.003	0.00001	0.00001	0.000	0.11	180,000	No	No
Tetrachloroethene (PCE)	**2880**	1.97E-03	17.290	0.04925	0.04920	3.198	1	1,000	No	No
Trichloroethene (TCE)	**132**	9.05E-05	0.792	0.00226	0.00225	0.147	0.5	14,000	No	No
cis-1,2-Dichloroethene (DCE)	**292**	2.00E-04	1.753	0.00499	0.00499	0.324	63	None	No	No
Dichlorodifluoromethane (Freon 12)	**2.7**	1.85E-06	0.016	0.00005	0.00005	0.003	12000	None	No	No
Acetone	**8.6**	5.89E-06	0.052	0.00015	0.00015	0.010	30000	180,000	No	No
Methylene Chloride	**1.2**	8.22E-07	0.007	0.00002	0.00002	0.001	2.1	14,000	No	No
trans-1,2-Dichloroethene	**2.4**	1.64E-06	0.014	0.00004	0.00004	0.003	63	None	No	No
2-Butanone (Methyl Ethyl Ketone)	**4.4**	3.02E-06	0.026	0.00008	0.00008	0.005	5000	13,000	No	No
Tetrahydrofuran	**18**	1.23E-05	0.108	0.00031	0.00031	0.020	350	30,000	No	No
1,1,1-Trichloroethane	**0.76**	5.21E-07	0.005	0.00001	0.00001	0.001	5000	9,000	No	No
Toluene	**0.41**	2.81E-07	0.002	0.00001	0.00001	0.000	5000	37,000	No	No
Chloromethane	**0.29**	1.99E-07	0.002	0.00000	0.00000	0.000	90	22,000	No	No
Trichlorofluoromethane	**1.8**	1.23E-06	0.011	0.00003	0.00003	0.002	5000	9,000	No	No
Chloroform	**1.0**	6.85E-07	0.006	0.00002	0.00002	0.001	0.043	150	No	No
Tertiary Butyl Alcohol	**0.42**	2.88E-07	0.003	0.00001	0.00001	0.000	720	None	No	No
Propylene	**2.2**	1.51E-06	0.013	0.00004	0.00004	0.002	3000	None	No	No
Xylenes (total)	**0.41**	2.81E-07	0.002	0.00001	0.00001	0.000	100	4,300	No	No

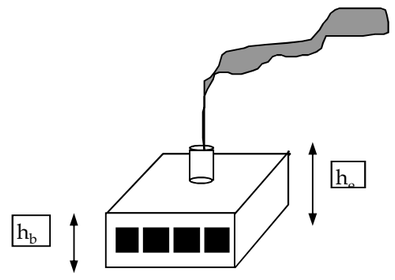
[1] VOC concentrations at outlet of SVE blower on 12 June 2012 prior to any treatment.

Equations Used:

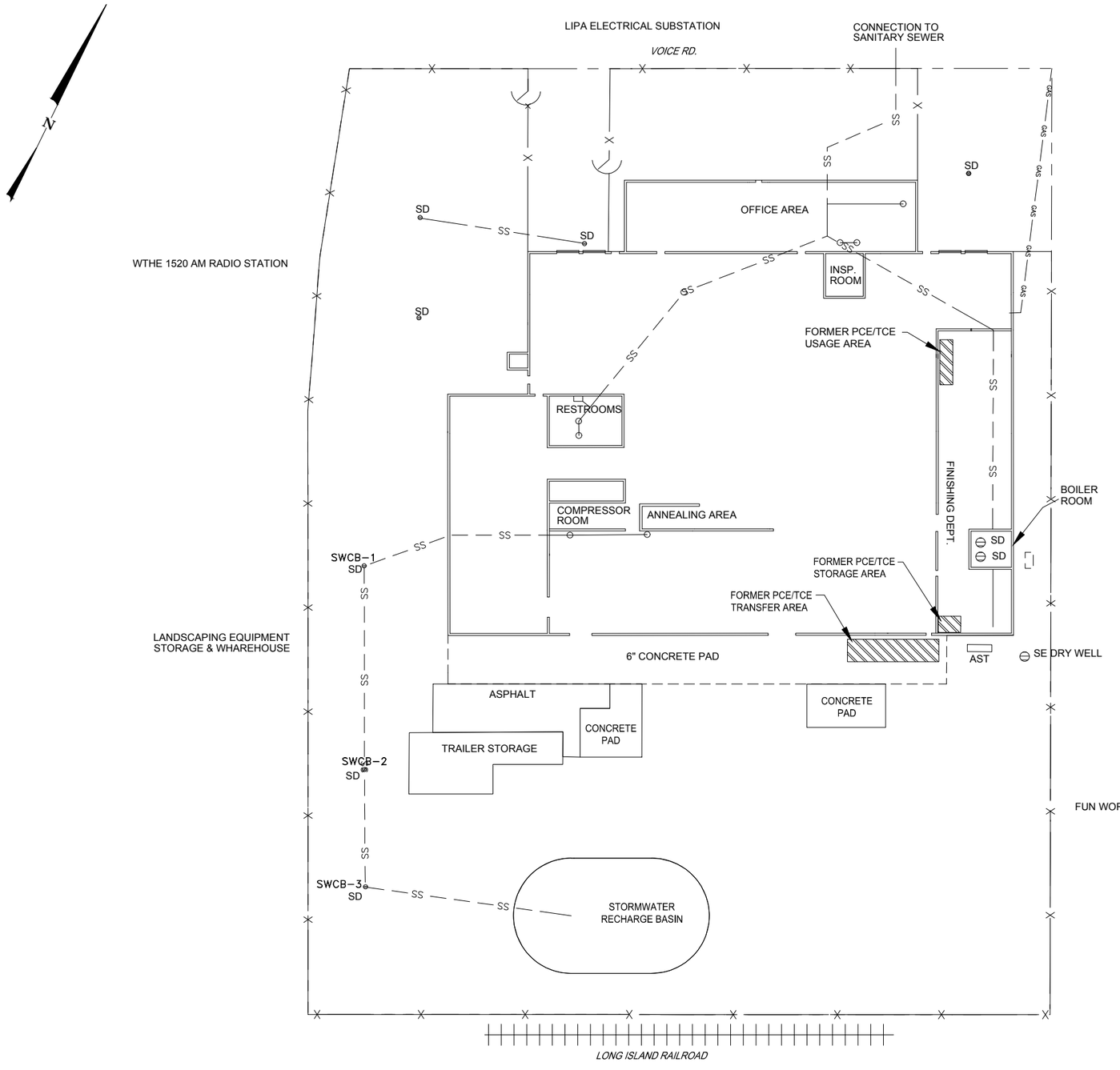
Maximum Actual Annual Impact
C_a (ug/m^3) = $(6.0*Q_a)/(h_e^{2.25})$
where Q_a is in lbs/yr and h_e is in feet

Maximum Potential Annual Impact
C_p (ug/m^3) = $(52500*Q)/(h_e^{2.25})$
where Q is lbs/hr and h_e is in feet

Maximum Short Term Impact
C_{st} (ug/m^3) = C_p * 65



Mass flow
Q = (C)(air flow in ft^3/min)(1 m^3/ 35.32 ft^3)(1 g/1,000,000 ug)(1 lb/453.6 g)(60 min/hr) where Q is in lb/hr and C is in ug/m^3
Q_a = (Q)(8760hr/yr); where Q_a is in lb/yr



LEGEND

- PROPERTY LINE/IC BOUNDARY
- FENCE
- RAILROAD
- SUBSURFACE DRAINAGE
- STORM DRAIN/DRYWELL
- FLOOR DRAIN
- AST ABOVEGROUND STORAGE TANK

0 30 60

GRAPHIC SCALE IN FEET

TITLE

FACILITY PLAN

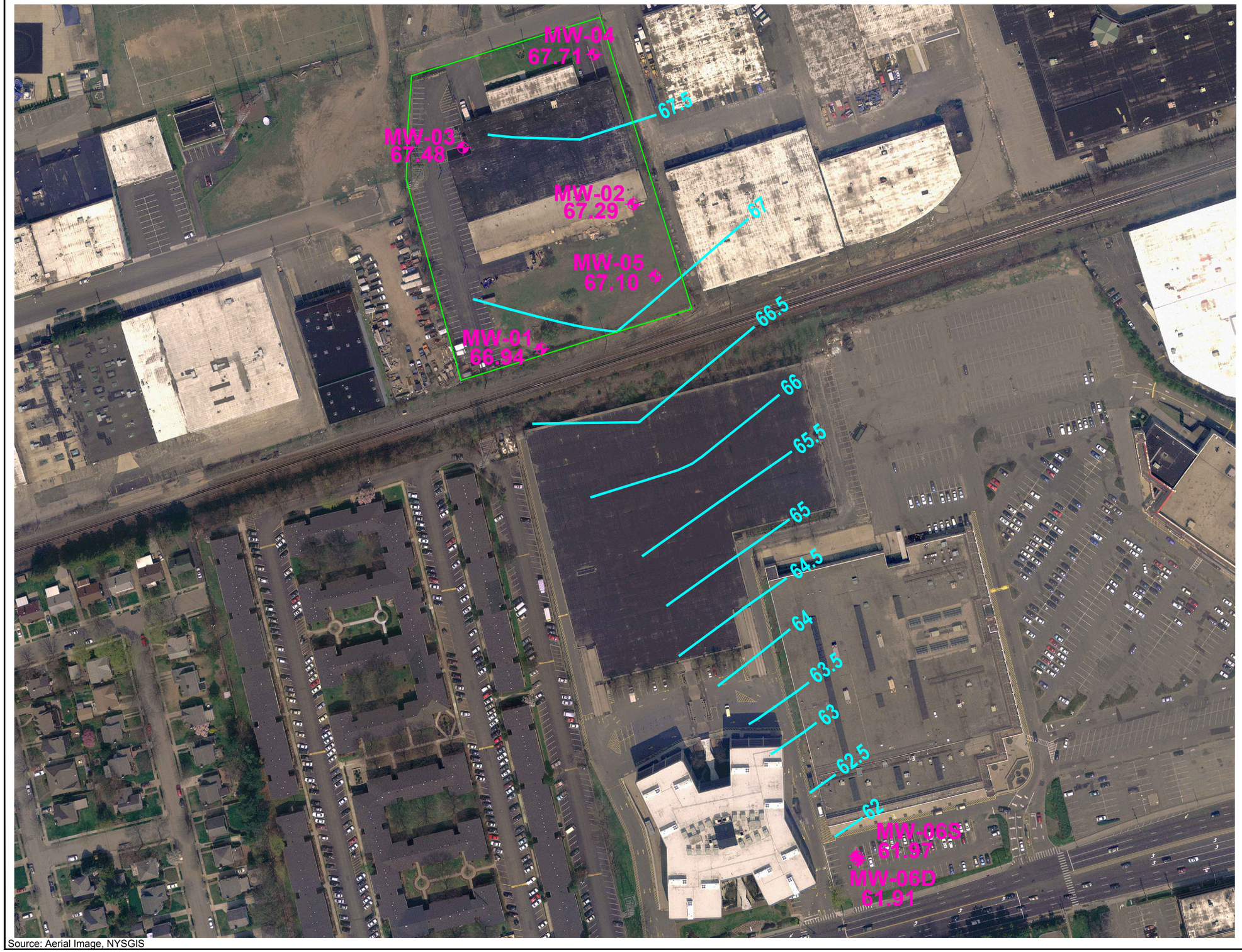
PREPARED FOR

JOHNSON & HOFFMAN MANUFACTURING

Environmental Resources Management

DRAWN BY	SCALE	DATE	JOB NO.	FIGURE
MLB/EMF	GRAPHIC	2/8/18	0422883.02	1-2

M:\Scout\Projects\Superior Group - J&H, Carle Place NY\CAD\2018 SMP\2018-02- J&H Facility Plan.DWG (02/08/2018 - 10:18am Melville)



Source: Aerial Image, NYSGIS

N

LEGEND

- Property Line/IC Boundary
- Monitoring Well Location
- Groundwater Elevation Contour
- 61.97 Groundwater Elevation Data

Groundwater Elevation Data in Feet Above Mean Sea Level

0 150 300

GRAPHIC SCALE IN FEET

TITLE

Water Table Contour Map
28 February 2011

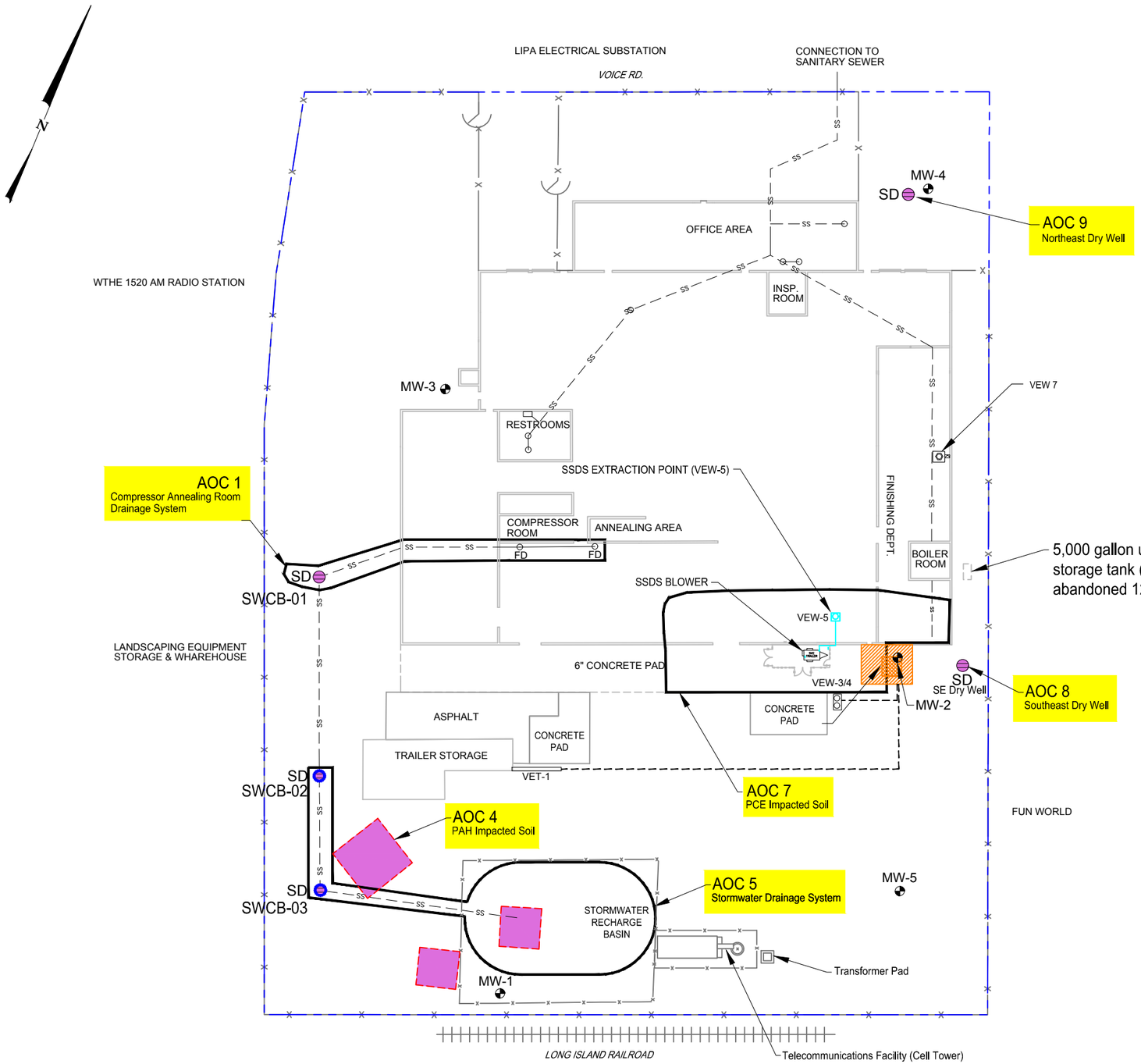
PREPARED FOR

JOHNSON & HOFFMAN MANUFACTURING

Environmental Resources Management

DRAWN BY	SCALE	DATE	JOB NO.	FIGURE
EMF	GRAPHIC	2/8/18	0422883.02	2-2

M:\Scout\Projects\Superior Group - J&H, Carle Place NY\CAD\2018 SMP\2018-02 - J&H - GW Contour Map-Feb 2011.dwg (02/08/2018 - 10:35am Melville)



LEGEND

- AOC Remediated
- Property Line/IC Boundary
- Fence
- Railroad
- Subsurface Drainage
- Storm Drain/Drywell
- Floor Drain
- Extent of AOC 7 Soil Excavation Completed in 2011 (6 ft Deep)
- Extent of AOC 7 Soil Excavation Completed in 2011 (10 ft Deep)
- Extent of 2017 Soil and Sediment Excavations
- Existing Soil Cover over Remaining Contamination (SWCB-02, SWCB-03)
- Location of Active Vapor Extraction Well (Shallow/Deep)
- Piping for SSDS Extraction Point
- Monitoring Well Location
- Below Ground Soil Vapor Recovery Line

Notes:

A deed restrictions is imposed on the entire 4.001 acre Site, the Site is subject to the following institutional and engineering controls:

1. Continued operation of the sub-slab depressurization system (SSDS);
2. The site cover will be maintained as a component of any future site development to allow for the commercial use of the site, which will consist either of the structures such as buildings, pavement, sidewalks comprising the site development or a soil cover in areas where the upper one foot of exposed surface soil will exceed the applicable SCOs.
3. Use and development of the entire property will be is restricted to commercial and industrial uses as defined by 6 NYCRR Part 375-1.8(g), although land use is subject to local zoning laws (currently zoned Industrial B (I-B).
4. The use of groundwater as a source of potable or process water is restricted, without necessary water quality treatment as determined by the NYSDOH or County DOH.
5. Completion and submittal to the Department of a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);
6. Compliance with the Departments approved Site Management Plan;
7. Compliance with the Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective;
8. Compliance with the Site Monitoring Plan to assess the performance and effectiveness of the remedy; and
9. Compliance with the Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, optimization, monitoring, inspection, and reporting of any mechanical or physical components of the remedy.

0 60 120

GRAPHIC SCALE IN FEET

TITLE

Remedial Elements - Completed

PREPARED FOR

JOHNSON & HOFFMAN MANUFACTURING

Environmental Resources Management

FIGURE 2-3

DRAWN BY	SCALE	DATE	JOB NO.
EMF	GRAPHIC	2/8/18	0422883.02

M:\Scout\Projects\Superior Group - J&H, Carle Place NY\CAD\2018 SMP\2018-02 - J&H -Remedial Elements - Completed.dwg (02/08/2018 - 11:14am Melville)

MW-03 Constituent	Units	NYSDEC TOGS	02/20/13
Tetrachloroethene	(ug/l)	5	1.0 U

MW-04 Constituent	Units	NYSDEC TOGS	02/20/13
Tetrachloroethene	(ug/l)	5	1.0 U

MW-02 Constituent	Units	NYSDEC TOGS	02/20/13
Tetrachloroethene	(ug/l)	5	2.2

MW-05 Constituent	Units	NYSDEC TOGS	02/20/13
Tetrachloroethene	(ug/l)	5	1.4

MW-01 Constituent	Units	NYSDEC TOGS	02/25/13
Tetrachloroethene	(ug/l)	5	[13.3]

GW-09 Constituent	Units	NYSDEC TOGS	01/31/08
Tetrachloroethene	(ug/l)	5	[12]

MW-06S Constituent	Units	NYSDEC TOGS	09/03/10
Tetrachloroethene	(ug/l)	5	1.0 U

MW-06D Constituent	Units	NYSDEC TOGS	09/03/10
Tetrachloroethene	(ug/l)	5	1.0 U

Source: Google Earth

N

LEGEND

NYSDEC TOGS	Division of Water Technical & Operational Guidance Series (1.1.1) Ambient Water Quality Standards & Guidance Values
[ ]	Exceedance of NYSDEC TOGS
U	Not detected at the indicated dectection limit
	Property Line/IC Boundary
	Ground Water Flow Direction
	Ground Water Sample Location
	Monitoring Well Location

0 150 300

GRAPHIC SCALE IN FEET

TITLE

Ground Water Sample Locations and Most Recent PCE Data

PREPARED FOR

JOHNSON & HOFFMAN MANUFACTURING

Environmental Resources Management

FIGURE 2-4

DRAWN BY	SCALE	DATE	JOB NO.
EMF	GRAPHIC	2/8/18	0422883.02

M:\Scout\Projects\Superior Group - J&H, Carle Place NY\CAD\2018 SMP\2018-02 - J&H - GW Samp Locs.dwg (02/08/2018 - 11:15am Melville)

MW-03

No Exceedance

MW-04 Constituent	Units	NYSDEC TOGS	09/03/10 Primary	09/03/10 Duplicate 1	12/06/12 Primary	12/06/12 Duplicate 1
Benzo(a)anthracene	(ug/l)	0.002	[0.668]	[0.862]	[0.121]J	[0.169]J
Benzo(a)pyrene	(ug/l)	ND	[1.10]	[1.25]	[0.167]J	[0.262]J
Benzo(b)fluoranthene	(ug/l)	0.002	[1.29]J	[2.19]J	[0.291]J	[0.478]J
Benzo(k)fluoranthene	(ug/l)	0.002	[1.37]J	[0.799]J	[0.132]J	[0.189]J
Chrysene	(ug/l)	0.002	[1.21]	[1.43]	[0.178]J	[0.287]J
Indeno(1,2,3-cd)pyrene	(ug/l)	0.002	[0.884]	[1.03]	[0.147]J	[0.233]J

MW-02

No Exceedance

MW-05

No Exceedance

MW-01 Constituent	Units	NYSDEC TOGS	09/03/10 Primary
Benzo(a)anthracene	(ug/l)	0.002	[0.0563]J
Benzo(a)pyrene	(ug/l)	ND	[0.103]
Benzo(b)fluoranthene	(ug/l)	0.002	[0.118]
Benzo(k)fluoranthene	(ug/l)	0.002	[0.121]
Chrysene	(ug/l)	0.002	[0.118]

MW-06S Constituent	Units	NYSDEC TOGS	09/03/10 Primary
Benzo(a)anthracene	(ug/l)	0.002	[0.269]
Benzo(a)pyrene	(ug/l)	ND	[0.233]
Benzo(b)fluoranthene	(ug/l)	0.002	[0.324]
Benzo(k)fluoranthene	(ug/l)	0.002	[0.181]
Chrysene	(ug/l)	0.002	[0.300]
Indeno(1,2,3-cd)pyrene	(ug/l)	0.002	[0.138]

MW-06D Constituent	Units	NYSDEC TOGS	09/03/10 Primary
Benzo(a)anthracene	(ug/l)	0.002	[0.437]
Benzo(a)pyrene	(ug/l)	ND	[0.481]
Benzo(b)fluoranthene	(ug/l)	0.002	[0.770]
Benzo(k)fluoranthene	(ug/l)	0.002	[0.388]
Chrysene	(ug/l)	0.002	[0.559]
Indeno(1,2,3-cd)pyrene	(ug/l)	0.002	[0.333]

Source: Google Earth

N

LEGEND

NYSDEC TOGS	Division of Water Technical & Operational Guidance Series (1.1.1) Ambient Water Quality Standards & Guidance Values
[ ]	Exceedance of NYSDEC TOGS
J	Analyte detected; value is a quantitative estimate.
ND	No Detection
	Property Line/IC Boundary
	Ground Water Flow Direction
	Monitoring Well Location

Notes:

1. PAHs analyzed by EPA Method 8270C using Selective Ion Monitoring (SIM).

0 150 300

GRAPHIC SCALE IN FEET

TITLE

PAH Exceedances in Groundwater

PREPARED FOR

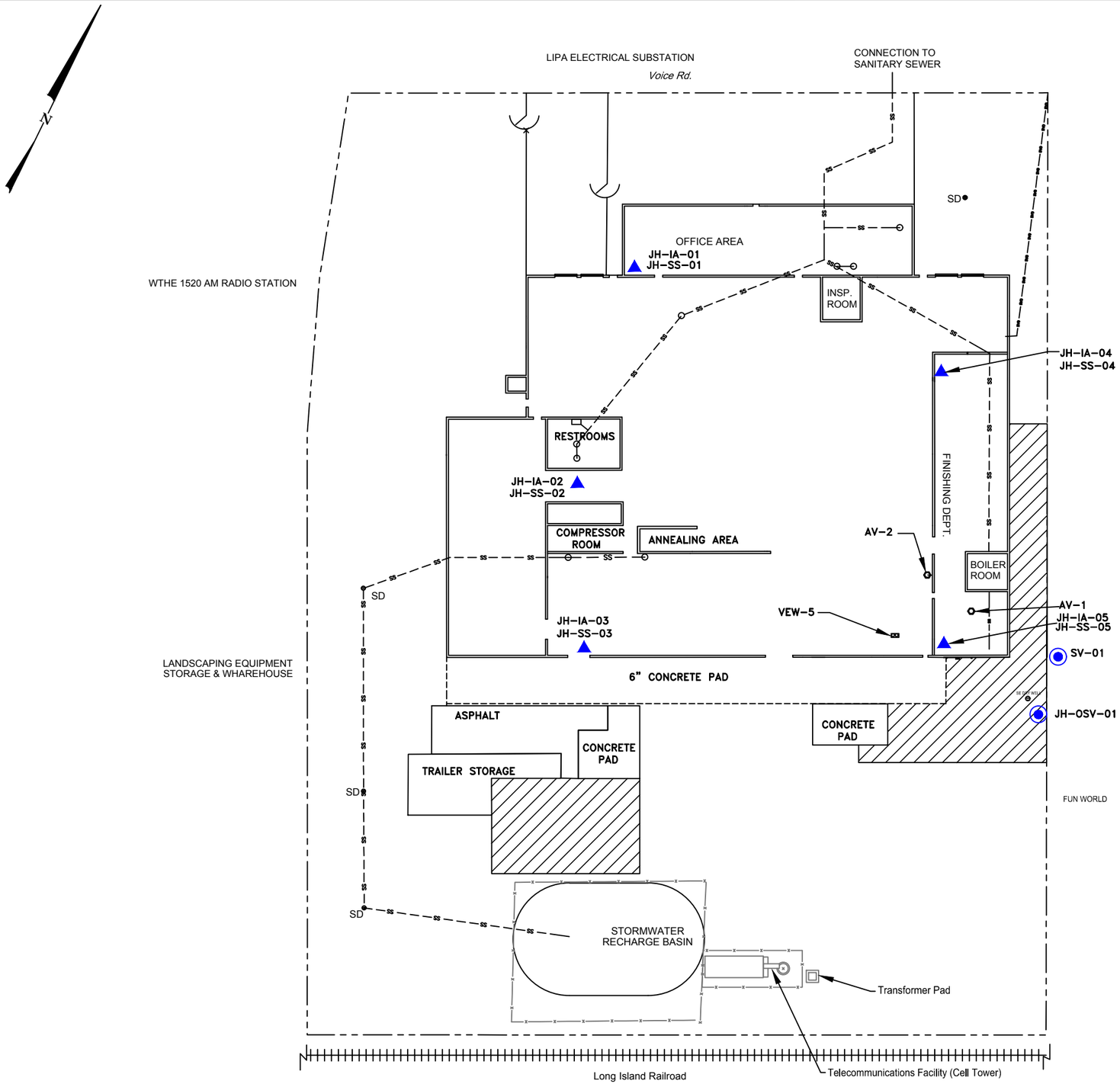
JOHNSON & HOFFMAN MANUFACTURING

Environmental Resources Management

FIGURE 2-5

DRAWN BY	SCALE	DATE	JOB NO.
EMF	GRAPHIC	2/8/18	0422883.02

M:\Scout\Projects\Superior Group - J&H, Carle Place NY\CAD\2018 SMP\2018-02 - J&H - GW PAH 2010-2012.dwg (02/08/2018 - 11:30am Melville)



Vacuum Response at Sub-Slab Monitoring Points

Vacuum Monitoring Point	Pressure (inches W.C.)				
	9/16/2011	3/7/2012	4/23/2013	2/17/2014	3/8/2016
VEW-5	-28	-31	-34	-	-37
JH-SS-01	-0.005	+0.003	0	0	0*
JH-SS-02	-0.020	+0.003	0	-0.012	-0.005
JH-SS-03	-0.022	0.000	0	-0.018	-0.007
JH-SS-04	-0.060	-0.023	-0.034	-0.033	-0.032
JS-SS-05	-0.164	-0.129	-0.16	-0.185	-0.162
AV-1	-0.166	NR	-0.19	-0.203	-0.255
AV-2	-0.360	NR	-0.37	-0.366	-0.376
Flow Rate (cfm)					
VEW-5 Flow Rate	180	185	202	204	201

* 3/8/16 JH-SS-01 located in lunch room had flooring laid over it. Reading collected on 5/20/16

Negative (-) sign indicates vacuum
Positive (+) sign indicates pressure
NR = No Reading

LEGEND

- Property Line/IC Boundary
- Fence
- Railroad
- Subsurface Drainage
- SD — Storm Drain/Drywell
- Indoor Air/Sub-Slab Soil Vapor Sample Location Requiring Mitigation
- Indoor Air/Sub-Slab Soil Vapor Sample Location
- Soil Vapor Sampling Location
- FD — Floor Drain
- 3 Inch Asphalt Cap With 6-Mil Polyethylene Liner
- Air Vent/Vacuum Monitoring Point (AV)
- VEW-5 — SVE Well Converted to an SSD Well

0 60' 120'
GRAPHIC SCALE IN FEET

TITLE
Indoor Air/Sub-Slab & Soil Vapor Sampling Locations

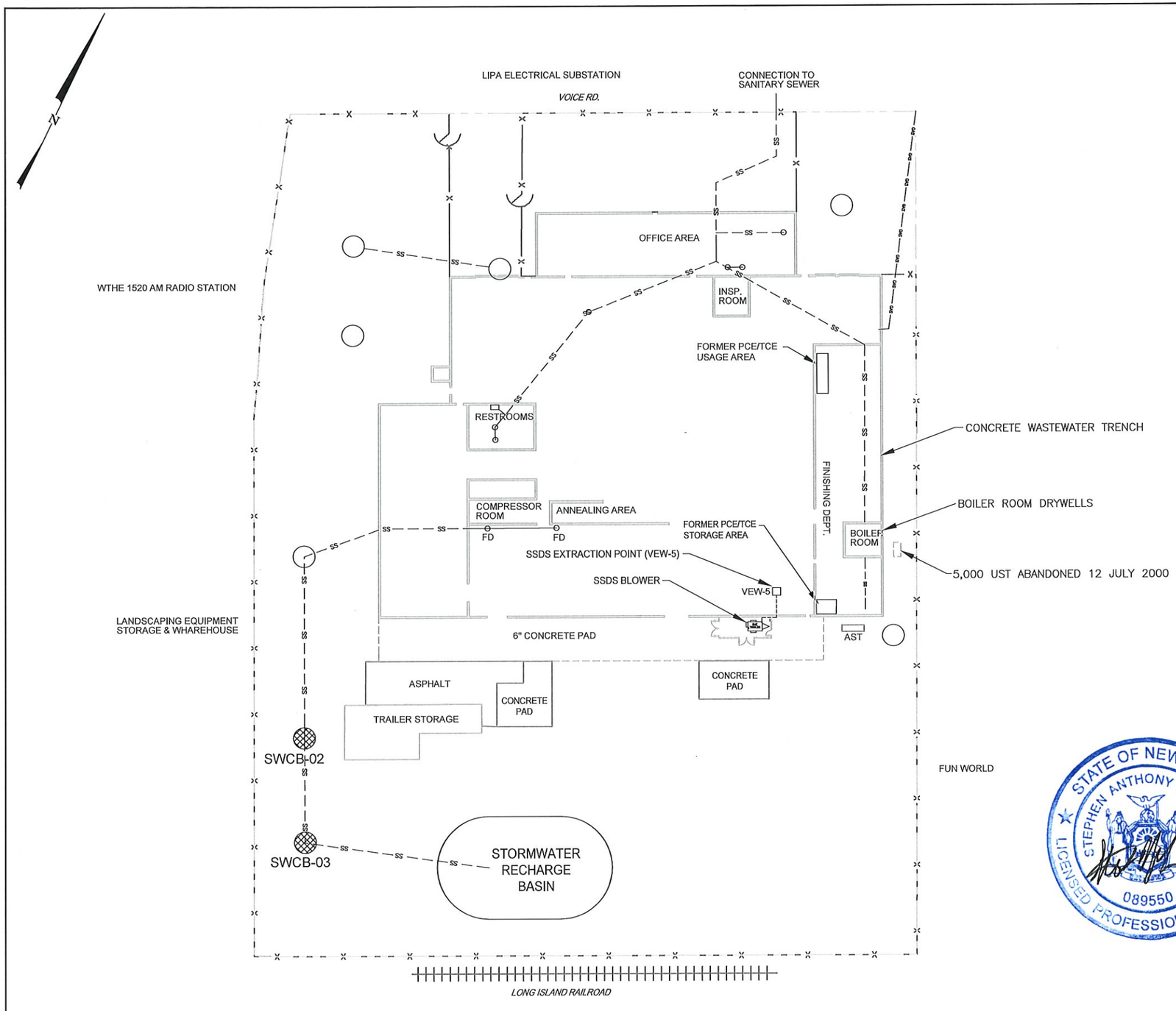
PREPARED FOR
JOHNSON & HOFFMAN MANUFACTURING

Environmental Resources Management

FIGURE 2-6

DRAWN BY	SCALE	DATE	JOB NO.
MLB/EMF	GRAPHIC	2/8/18	0422883.02

M:\Scout\Projects\Superior Group - J&H, Carle Place NY\CAD\2018 SMP\2018-02 - J&H - IA-SS-SV-Sampling Locations.dwg (02/08/2018 - 11:46am Melville)



LEGEND

- PROPERTY LINE/IC BOUNDARY
- FENCE
- RAILROAD
- SUBSURFACE DRAINAGE
- STORM DRAIN/DRYWELL
- FLOOR DRAIN
- DEED RESTRICTION FOR MAINTENANCE OF SOIL CAP
- LOCATION OF VAPOR EXTRACTION WELL (SHALLOW/DEEP)
- PIPING FOR SSDS EXTRACTION POINT

Notes:

A deed restrictions is imposed on the entire 4.001 acre Site, the Site is subject to the following institutional and engineering controls:

1. Continued operation of the sub-slab depressurization system (SSDS);
2. The site cover will be maintained as a component of any future site development to allow for the commercial use of the site, which will consist either of the structures such as buildings, pavement, sidewalks comprising the site development or a soil cover in areas where the upper one foot of exposed surface soil will exceed the applicable SCOs.
3. Use and development of the entire property will be is restricted to commercial and industrial uses as defined by 6 NYCRR Part 375-1.8(g), although land use is subject to local zoning laws (currently zoned Industrial B (I-B).
4. The use of groundwater as a source of potable or process water is restricted, without necessary water quality treatment as determined by the NYSDOH or County DOH.
5. Completion and submittal to the Department of a periodic certification of institutional and engineering controls in accordance with Part 375-1.8 (h)(3);
6. Compliance with the Departments approved Site Management Plan;
7. Compliance with the Institutional and Engineering Control Plan that identifies all use restrictions and engineering controls for the site and details the steps and media-specific requirements necessary to ensure the following institutional and/or engineering controls remain in place and effective;
8. Compliance with the Site Monitoring Plan to assess the performance and effectiveness of the remedy; and
9. Compliance with the Operation and Maintenance (O&M) Plan to ensure continued operation, maintenance, optimization, monitoring, inspection, and reporting of any mechanical or physical components of the remedy.

0 60' 120'

GRAPHIC SCALE IN FEET

TITLE

Facility Plan Showing Institutional Controls & Engineering

PREPARED FOR

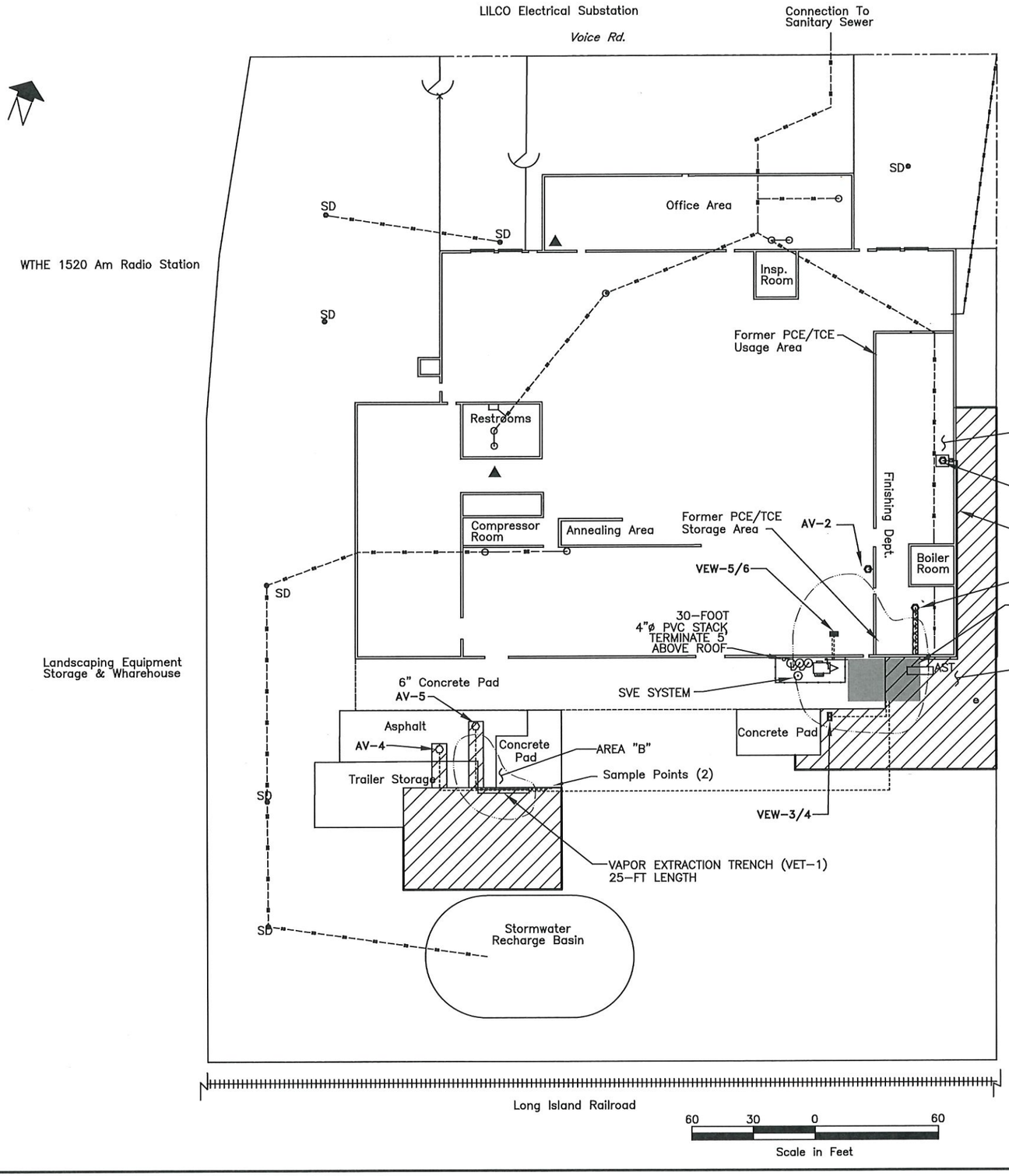
JOHNSON & HOFFMAN MANUFACTURING

Environmental Resources Management

FIGURE 3-1

DRAWN BY	SCALE	DATE	JOB NO.
MLB/EMF	GRAPHIC	2/8/18	0422883.02

M:\Scout\Projects\Superior Group - J&H, Carle Place NY\CAD\2018 SMP\2018-02 - J&H - Facility Plan showing Proposed Institutional Controls.dwg (02/08/2018 - 11:28am Melville)



STATE OF NEW YORK
STEPHEN ANTHONY MIRABELLO
089550
LICENSED PROFESSIONAL ENGINEER

LEGEND

- 3-inch Asphalt Cap with 6-mil Polyethylene Liner
- Soil Vapor Extraction Wells (VEW) (See Drawing 2)
- Air Vent/Vacuum Monitoring Point (AV) (See Drawing 2)
- Property Line/IC Boundary
- Fence
- Railroad
- Subsurface Drainage
- SD Storm Drain/Dry Well
- Monitoring Well
- Area of Soil Above RSCOs for PCE, TCE & DCE
- Below ground Soil Vapor Recovery Line
- Aboveground Soil Vapor Recovery Line
- Concrete slab pipe trench, Pipe trench not penetrating Finishing room secondary containment
- Sub-slab soil vapor sampling point

Note: Active components include only VEW-5 and System at issuance of 2018 SMP/FER.

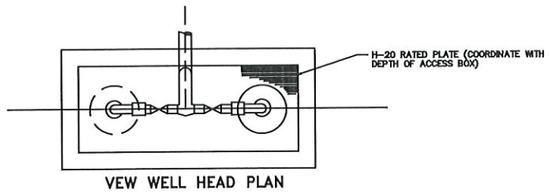
TITLE
AS-BUILT FOR 2018 SMP
SOIL VAPOR EXTRACTION WELL SYSTEM LAYOUT

JOHNSON & HOFFMAN MANUFACTURING CORP.
CARLE PLACE, NEW YORK

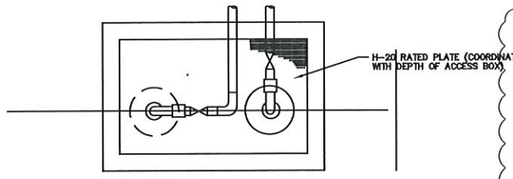
PREPARED FOR
JOHNSON & HOFFMAN MANUFACTURING

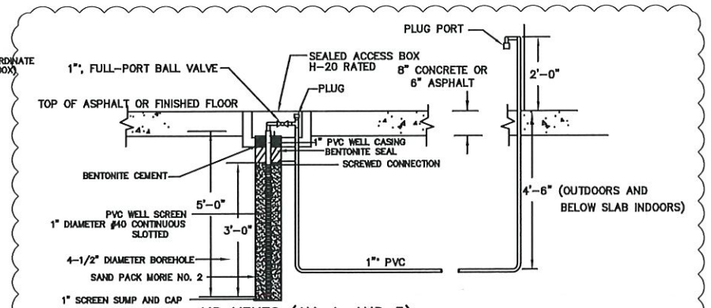
ERM NORTHEAST ENGINEERS P.C.
ERM

DRAWN:	JOB NO.:	FILE NAME:	SCALE	FIGURE
EMF	0422883.02		GRAPHIC	5-1
			DATE 2/21/18	

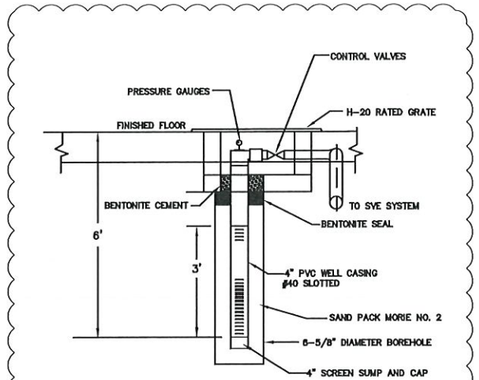


VEW WELL HEAD PLAN

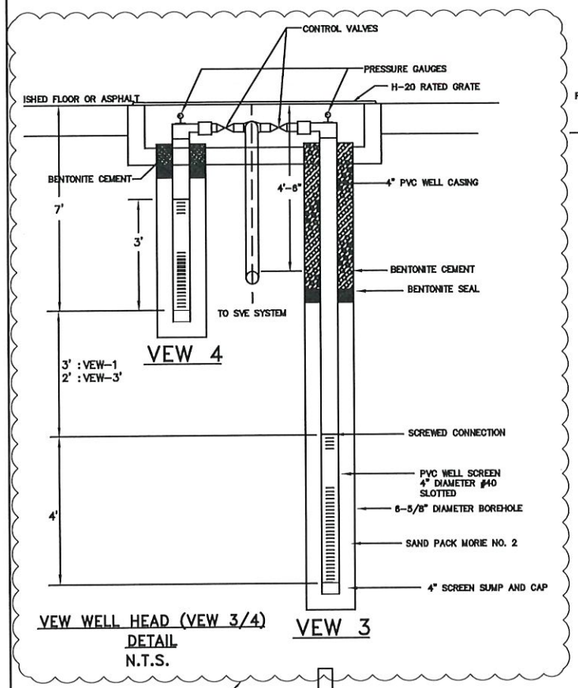




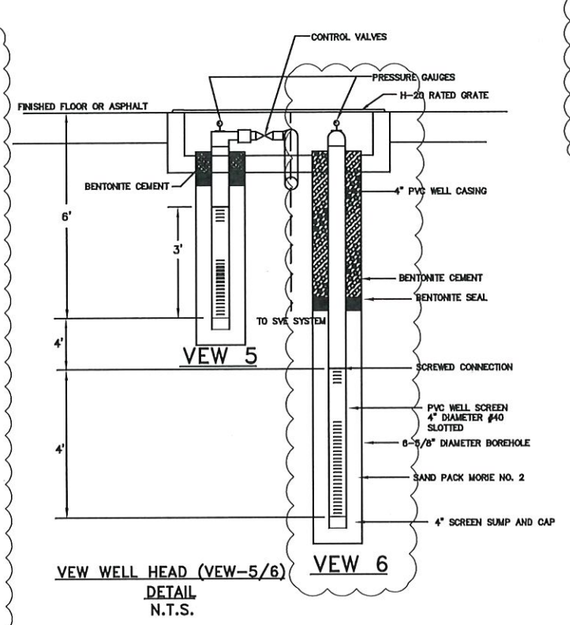
AIR VENTS (AV-4, AND 5) AND MONITORING WELL DETAIL
N.T.S.



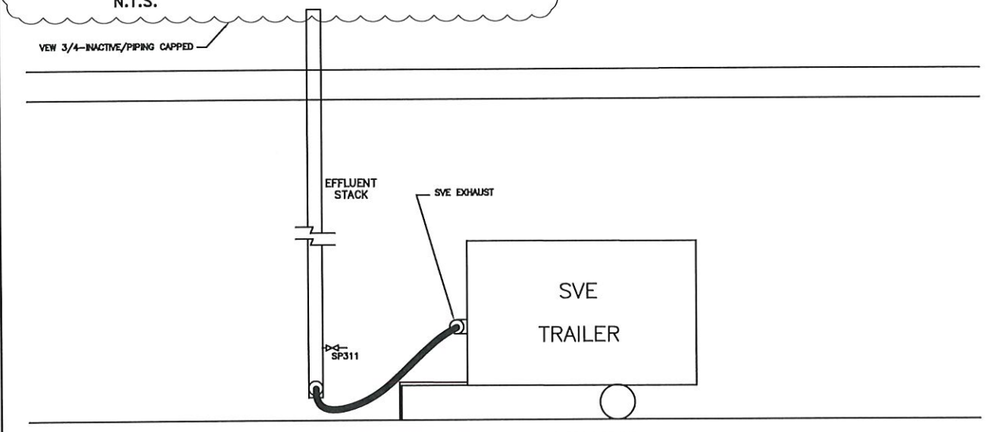
VEW-7 WELL HEAD DETAIL
N.T.S.



VEW WELL HEAD (VEW 3/4) DETAIL
N.T.S.

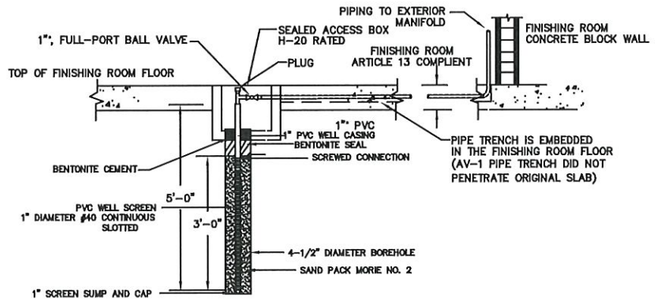


VEW WELL HEAD (VEW-5/6) DETAIL
N.T.S.

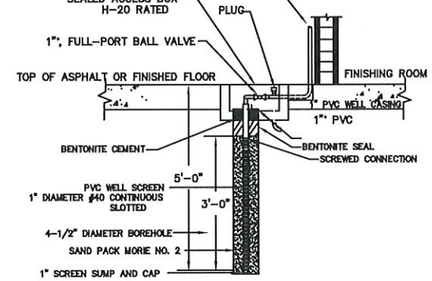


SYSTEM CAPABLE TO BE REFITTED WITH CARBON. PREVIOUSLY CARBON DRUMS WERE MODEL NO VCS-400BY US-FILTER

SVE SYSTEM ELEVATION VIEW
N.T.S.



AIR VENT AV-1 AND MONITORING WELL DETAIL
N.T.S.



AIR VENT AV-2 AND MONITORING WELL DETAIL
N.T.S.

NOTES:
1. PIPING TO SOIL VAPOR EXTRACTION SYSTEM WAS PITCHED TOWARDS THE WELL AT A MINIMUM OF 1/2%.
2. SAMPLE PORT AND GAUGE TAPPED DIRECTLY INTO PVC.
3. DEPTHS OF SCREEN FOR VAPOR EXTRACTION WELLS AND AIR VENTS WERE FIELD VERIFIED AND ADJUSTED BASED ON FIELD CONDITIONS
4. VAPOR EXTRACTION WELLS WERE FINISHED BELOW GRADE.
5. NTS: NOT TO SCALE

LEGEND
- SAND PACK
- COMPONENT INACTIVE
- (#4) - BENTONITE SEAL
- CEMENT/BENTONITE

NO.	DATE	APPR.	REVISION	NO.	DATE	APPR.	REVISION

JOHNSON & HOFFMAN MANUFACTURING

INTERIM REMEDIAL MEASURE SOIL VAPOR EXTRACTION SYSTEM

ERM Northeast Engineers P.C.

	CHECKED	DATE
DESIGN ENGINEER		
PROJECT ENGINEER		
PROJECT MANAGER		
APPROVED		
APPROVED		

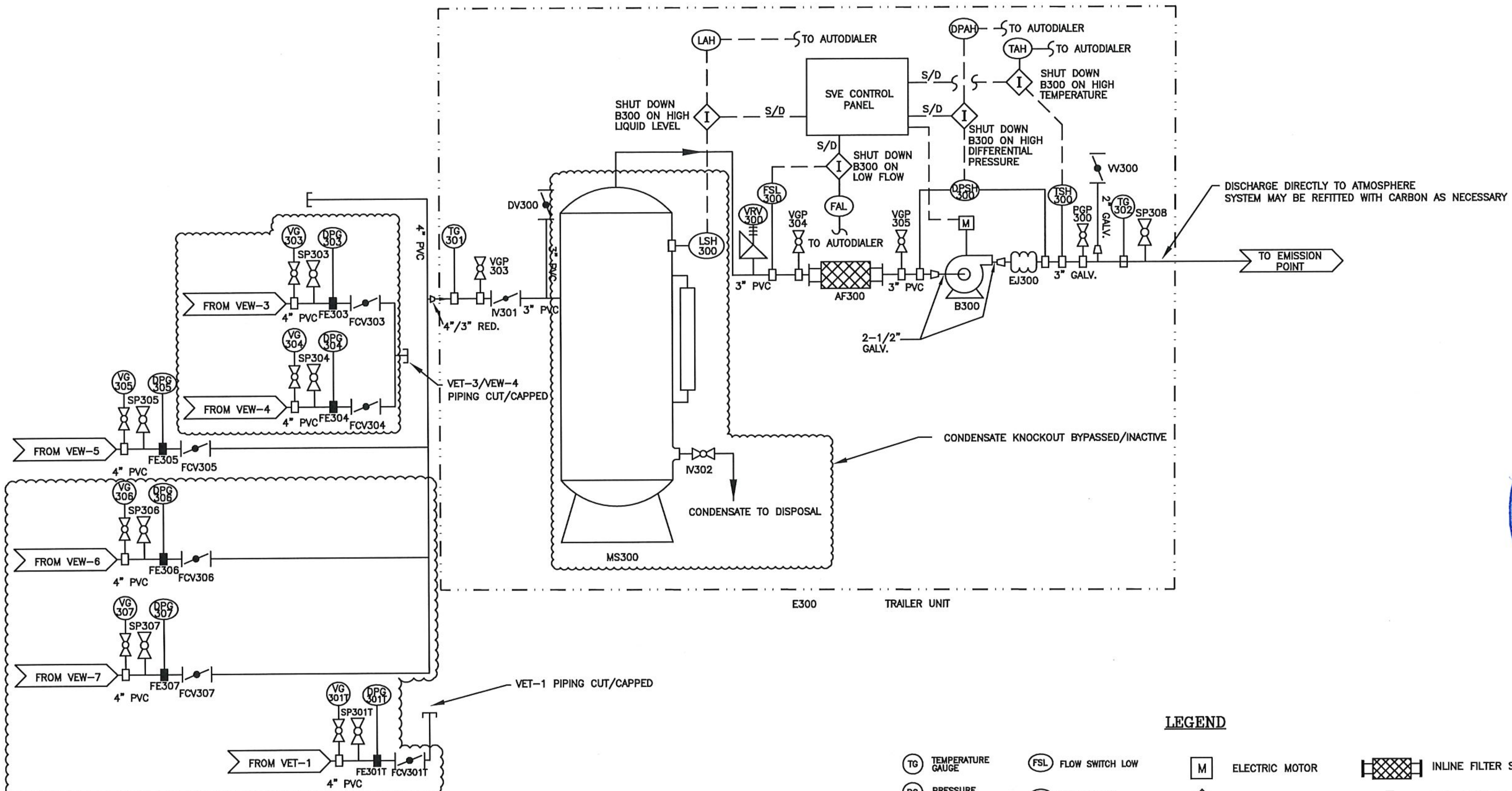
AS BUILT
SVE WELL AND AIR VENT DETAILS
JOHNSON & HOFFMAN MANUFACTURING CORP.
CARLE PLACE, NEW YORK

DRAWN	DATE	REVISION DATE
ESW/JMC	2/21/18	
SCALE	JOB NO.	FILE NAME
NONE	0422883.02	

DRAWING NO. 5-2 REV. NO.

SHEET OF

M:\Data\Projects\Superior Group - JAH, Carle Place NY-(ACS)\2018 SMP\2018-02 - JAH - SVE DETAILS AS-BUILT for 2018 SMP.dwg (02/21/2018 - 1:04pm) kelleher)



LEGEND

- TG — TEMPERATURE GAUGE
- PG — PRESSURE GAUGE
- VG — VACUUM GAUGE
- DPG — DIFFERENTIAL PRESSURE GAUGE
- TSH — TEMPERATURE SWITCH HIGH
- DPSH — DIFFERENTIAL PRESS. SWITCH HIGH
- LSH — LEVEL SWITCH HIGH
- FSL — FLOW SWITCH LOW
- TAH — TEMPERATURE ALARM HIGH
- DPAH — DIFFERENTIAL PRESS. ALARM HIGH
- LAH — LEVEL ALARM HIGH
- FAL — FLOW ALARM LOW
- VRV — VACUUM RELIEF VALVE
- M — ELECTRIC MOTOR
- ELECTRIC INTERLOCK
- AIR RELEASE VALVE
- BALL VALVE (MANUAL)
- REGENERATIVE BLOWER
- INLINE FILTER SILENCER
- PIPE CONNECTION
- EXPANSION JOINT
- BUTTERFLY VALVE (MANUAL)
- FLOW ELEMENT
- REDUCTION/EXPANSION
- COMPONENT INACTIVE

ABBREVIATIONS

MS	MOISTURE SEPARATOR	E	ENCLOSURE
AF	AIR FILTER	FE	FLOW ELEMENT
B	BLOWER	VET	VAPOR EXTRACTION TRENCH
IV	ISOLATION VALVE	VEW	VAPOR EXTRACTION WELL
DV	DILUTION VALVE	S/D	SHUT DOWN
SP	SAMPLE PORT	EJ	EXPANSION JOINT
VGP	VACUUM GAUGE PORT	GAC	GRANULAR ACTIVATED CARBON
PGP	PRESSURE GAUGE PORT		

LINE TYPE IDENTIFICATION

- — — — ELECTRICAL
- — · · — ENCLOSURE

NO.	DATE	APPR.	REVISION	NO.	DATE	APPR.	REVISION

JOHNSON & HOFFMAN MANUFACTURING

INTERIM REMEDIAL MEASURE SOIL VAPOR EXTRACTION SYSTEM

ERM Northeast Engineers P.C.

ERM

CHECKED	DATE
DESIGN ENGINEER	
PROJECT ENGINEER	
PROJECT MANAGER	
APPROVED	
APPROVED	

AS BUILT
PROCESS & INSTRUMENTATON DIAGRAM
JOHNSON & HOFFMAN MANUFACTURING CORP.
CARLE PLACE, NEW YORK

DRAWN: ESW/JMC	DATE: 2/8/18	REVISION DATE	
SCALE: NONE	JOB NO.: 0422883.02	FILE NAME	

DRAWING NO. 5-3

REV. NO.

SHEET OF

APPENDIX A

Declaration of Covenants and Restrictions

Nassau County
Maureen OConnell
County Clerk
Mineola, NY 11501

Instrument Number: 2016- 00109371
As
D06 - AGREEMENT

Recorded On: November 02, 2016
Parties: ANSACO PROPERTIES ONE LLC
TO
Recorded By: JEFFREY C ANSARY

Billable Pages: 4
Num Of Pages: 5
Comment:

** Examined and Charged as Follows: **

D06 - AGREEMENT	65.00	Blocks - Deeds - $300	300.00
Recording Charge:	365.00		

Property Description:

Line	Section	Block	Lot	Unit	Town Name
1	9	663	8		N. HEMPSTEAD

** THIS PAGE IS PART OF THE INSTRUMENT **

I hereby certify that the within and foregoing was recorded in the Clerk's Office For: Nassau County, NY

File Information:

Document Number: 2016- 00109371
Receipt Number: 442479
Recorded Date/Time: November 02, 2016 03:25:17P
Book-Vol/Pg: Bk-D Vl-13432 Pg-734
Cashier / Station: 0 TMS / NCCL-CCR1FP2

Record and Return To:

JEFF ANSARY
6212 28TH ST N
ARLINGTON VA 22207

Maureen O'Connell

County Clerk Maureen O'Connell

DECLARATION of COVENANTS and RESTRICTIONS

THIS DECLARATION OF COVENANTS AND RESTRICTIONS ("DC&R") is made the 2 day of Nov. 2016, by Ansaco Properties One, LLC ("Ansaco"), a Delaware limited liability company, having an office for transaction of business located at 56 East 13th Street, 4th Floor, New York, New York 10003.

WHEREAS, the Johnson & Hoffman Manufacturing Corp. Site, Site #V00684, (the "Site") is the subject of Voluntary Cleanup Agreement ("VCA"), Index # W1-0979-03-12, effective July 16, 2004 and amended Sep. 9, 2016.

WHEREAS, the Site is namely that parcel of real property located at the address of 40 Voice Road, Carle Place, in the Town of North Hempstead, County of Nassau, State of New York, being the same as (or part of) that property conveyed to Ansaco by Manley by deed dated October 2, 2015 and recorded on January 7, 2016 in the Nassau County Clerk's Office at Book D, Volume 13307, Page 398, Document Number: 2016-00002172, and being more particularly described in Appendix "A," attached to this declaration and made a part hereof, and hereinafter referred to as "the Property"; and

WHEREAS, the Department approved a remedy to eliminate or mitigate all significant threats to the environment presented by the contamination disposed of at the Property and such remedy requires that the Property be subject to restrictive covenants.

NOW, THEREFORE, Ansaco, as fee owner of the Property, for itself and its successors and/or assigns, covenants that:

First, the Property subject to this Declaration of Covenants and Restrictions is as shown on the survey map prepared by Joseph Nicoletti Associates Professional Land Surveyors P.C., dated 04/17/2004, last revised 7/22/2015 and attached to this declaration as Schedule "B" and made a part hereof.

Second, unless prior written approval by the Department or, if the Department shall no longer exist, any New York State agency or agencies subsequently created to protect the environment of the State and the health of the State's citizens, hereinafter referred to as "the Relevant Agency," is first obtained, where contamination remains at the Property subject to the provisions of the Site Management Plan ("SMP"), there shall

e no construction, use or occupancy of the Property that results in the disturbance or excavation of the Property which threatens the integrity of the engineering controls or which result in unacceptable human exposure to contaminated soils.

Third, the owner of the Property shall not disturb, remove, or otherwise interfere with the installation, use, operation, and maintenance of engineering controls required for the Remedy, which are described in the SMP, unless in each instance it first obtains a written waiver of such prohibition for the Department or Relevant Agency. A copy of the SMP may be obtained from the New York State Department of Environmental Conservation, Division of Environmental Remediation, Site Control Section, 625 Broadway, Albany, NY 12233.

Fourth, the owner of the Property shall prohibit the Property from ever being used for purposes other than for a "Commercial" as described in 6 NYCRR Part 375-1.8(g)(2)(iii) and "Industrial" as described in 6 NYCRR Part 375-1.8(g)(2)(iv) without the express written waiver of such prohibition by the Department or Relevant Agency.

Fifth, the use of groundwater underlying the Property is prohibited without necessary water quality treatment as determined by the NYSDOH or the Nassau County Department of Health to render it safe for use as drinking water or for industrial purposes, as appropriate, unless the user first obtains permission to do so from the Department or Relevant Agency.

Sixth, the owner of the Property shall provide a periodic certification, prepared and submitted by a professional engineer or environmental professional acceptable to the Department or Relevant Agency, which will certify that the institutional and engineering controls put in place are unchanged from the previous certification, comply with the SMP, and have not been impaired.

Seventh, the owner of the Property shall continue in full force and effect the institutional and engineering controls required for the Remedy and maintain such controls, unless the owner first obtains permission to discontinue such controls from the Department or Relevant Agency, in compliance with the Department-approved SMP which is incorporated and made enforceable hereto, subject to modifications as approved by the Department or Relevant Agency.

Eighth, this DC&R is and shall be deemed a covenant that shall run with the land and shall be binding upon all future owners of the Property, and shall provide that the owner and its successors and assigns consent to enforcement by the Department or Relevant Agency of the prohibitions and restrictions that the VCA requires to be recorded, and hereby covenant not to contest the authority of the Department or Relevant Agency to seek enforcement.

Ninth, any deed conveyance of the property any portion thereof, shall recite, unless the Department or Relevant Agency has consented to the termination of such covenants and restrictions, that said conveyance is subject to this Declaration of Covenants and Restrictions.

IN WITNESS WHEREOF, the undersigned has executed this instrument the day written below.

By: Jeffrey C Anwiry

Print Name: Jeffrey C Anwiry

Title: President Date: 11/2/2016

STATE OF NEW YORK)

) s.s.:

COUNTY OF Suffolk)

On the 2nd day of November, in the year 201_, before me, the undersigned, personally appeared Jeffrey C. Anwiry, personally known to me or proved to me on the basis of satisfactory evidence to be the individual(s) whose name is (are) subscribed to the within instrument and acknowledged to me that he/she/they executed the same in his/her/their capacity(ies), and that by his/her/their signature(s) on the instrument, the individual(s), or the person upon behalf of which the individual(s) acted, executed the instrument.

Denise L Lehalem

Notary Public State of New York

DENISE LINALEN

2h1n

Appendix "A"

ALL that certain plot, piece or parcel of land, situate, lying and being in the Town of North Hempstead, County of Nassau and State of New York, bounded and described as follows

BEGINNING at a point on the southerly side of Voice Road, distant the following 3 courses and distances from the northwesterly end of a tie line bearing north 47 degrees 48 minutes 39 seconds west having a radius of 31.13 feet, connecting the southerly line of Voice Road with the westerly side of Glen Cove Road,

1 South 84 degrees 20 minutes 50 seconds west 365.91 feet,

2 North 5 degrees 39 minutes 10 seconds west 9.00 feet,

3 South 84 degrees 20 minutes 50 seconds west 953.66 feet to the point or place of BEGINNING

THENCE south 5 degrees 39 minutes 10 seconds east 469.69 feet to the northerly line of the land of the Long Island Rail Road (Main Line),

THENCE south 84 degrees 20 minutes 50 seconds west along the northerly line of the land of the Long Island Rail Road, 378.77 feet to the land formerly of Long Island Motor Parkway,

THENCE north 5 degrees 39 minutes 10 seconds west along said land formerly of Long Island Motor Parkway 200.10 feet to a point of curve,

THENCE still northerly and still along said land formerly of Long Island Motor Parkway, along the arc of a curve bearing to the right having a radius of 908.69 feet a distance along said curve of 273.75 feet to the southerly side of Voice Road,

THENCE north 84 degrees 20 minutes 50 seconds east along the southerly side of voice road, 337.67 feet to the point or place of BEGINNING

For conveyancing only: if intended to be conveyed

Together with all right, title and interest of, in and to any streets and roads abutting the above described premises, to the center line thereof

R + R

Jeff Ansury
6212 28th St N
Arlington VA 22207

STATE OF NEW YORK }
COUNTY OF NASSAU }
COUNTY CLERK'S OFFICE

I, MAUREEN O'CONNELL, County Clerk of the County of Nassau and the Supreme and County Courts, Courts of Record thereof,

DO HEREBY CERTIFY, that I have compared the annexed with the original

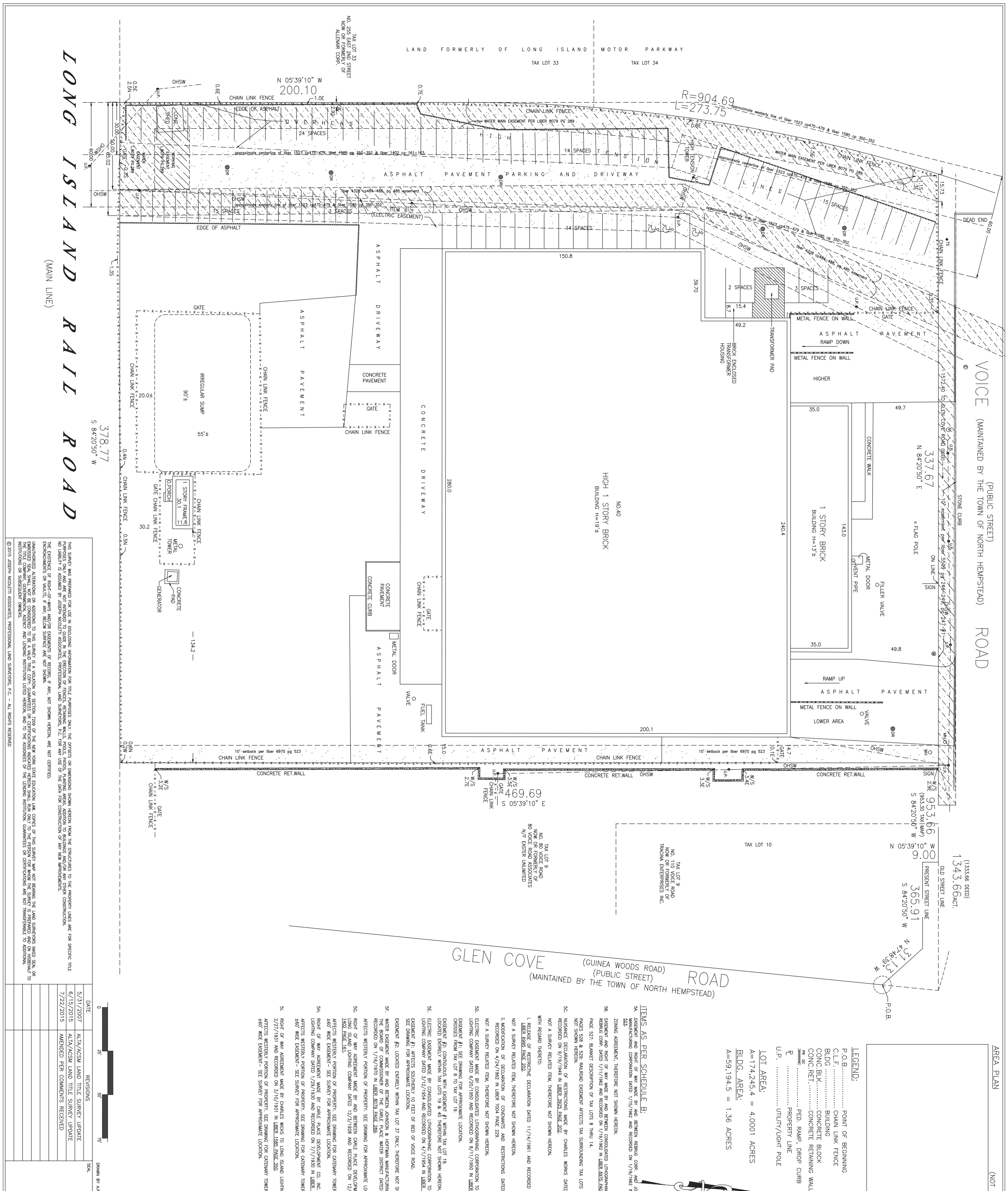
DEED AGREEMENT: D 13432 PAGE: 734

FILED 11-2-2016 a true transcript thereof and of the whole of such original.

IN TESTIMONY WHEREOF, I have hereunto set my hand and affixed THE 30TH OF JANUARY, 2017.

Maureen O'Connell
County Clerk

Appendix "B"
Survey Map



APPENDIX B – LIST OF SITE CONTACTS

Name	Phone/Email Address
Ansaco Properties One LLC – Site Owner/Volunteer	616-402-6138 contact@ansacollc.com
Manley Holdings, Inc. – Remedial Party/Volunteer	215-947-3333 bmanley@jadecorp.com
CAWSL Enterprises, Inc. – Volunteer	610-397-2713 Rick.warden@superiorgroup.com
Ernie Rossano – Environmental Professional]	631-756-8917 Ernie.rossano@erm.com
Girish Desai – NYSDEC Project Manager	631- 444-0243 girish.desai@dec.ny.gov
Walter Parish – NYSDEC Regional HW Engineer	(631) 444-0240 walter.parish@dec.ny.gov
Kelly Lewandowski - NYSDEC Site Control	518-402-9553 kelly.lewandowski@dec.ny.gov
Steven Karpinski – NYSDOH	(518) 402-7860, steven.karpinski@health.ny.gov
Christopher Boyle – Remedial Party Attorney	215-988-2962 Christopher.boyle@dbr.com

APPENDIX C

Site Geologic and Well Logs

Liesch Associates, Inc.

Project:	GHJM - AEC Acquisition
Drilling Contractor:	New England Boring Contractors
Logged By:	Dan Larson
Date Start:	2/10/99
Date Finished:	2/10/99
E.O.B. (ft.)	57
Borehole Number:	MW-1
Location	South side of property
Drilling Equipment:	Mobile drill B53
Driller:	Mike St. John & Brian Sullivan
Surface Elevation:	

Depth (Ft.)	Description of Material	USCS	PID	Geologic Origin	Samples	Notes
	0-2' Brown sandy, gravelly silt loam	ML	0.0			
	2-4' Same	ML	0.0			
-5	4-6' Golden brown gravelly coarse-grained sand	SP	0.0			
	6-8' Same	SP	0.0			
	8-10' Same	SP	0.0			
-10	10-12' Same	SP	0.0			
	12-14' Same	SP	0.0			
-15	14-16' Golden brown sandy gravel	SP	2.4			
	16-18' Same	GP	0.0			
-20	18-20' Golden brown gravelly coarse-grained sand	SP	0.0			
-25						

NOTES

Liesch Associates, Inc.

Project:	GHJM - AEC Acquisition
Drilling Contractor:	New England Boring Contractors
Logged By:	Dan Larson
Date Start:	2/10/99
Date Finished:	2/10/99
E.O.B. (ft.)	57
Borehole Number:	MW-1
Location	South side of property
Drilling Equipment:	Mobile drill B53
Driller:	Mike St. John & Brian Sullivan
Surface Elevation:	

Depth (Ft.)	Description of Material	USCS	PID	Geologic Origin	Samples	Notes
	25-27' Same	SP	0.0			
-30	30-32' Same	SP	0.0			
-35						
-40	40-42' No recovery	--	--			
-45						
-50	50-52' Golden brown sandy gravel	GP	0.0			

NOTES

Liesch Associates, Inc.

Project:	GHJM - AEC Acquisition
Drilling Contractor:	New England Boring Contractors
Logged By:	Dan Larson
Date Start:	2/11/99
Date Finished:	2/11/99
E.O.B. (ft.)	57
Borehole Number:	MW-2
Location	Near SE Building corner
Drilling Equipment:	Mobile drill B53
Driller:	Mike St. John & Brian Sullivan
Surface Elevation:	

Depth (Ft.)	Description of Material	USCS	PID	Geologic Origin	Samples	Notes
	0-2' Brown sandy gravelly silt loam		1999.0			Chemical odor
	2-4' Same		1999.0			Chemical odor
-5	4-6' Same		1999.0			Moist, chemical odor
	6-8' Same		1763.0			Chemical odor
	8-10' Golden brown sandy gravel	GP	200.2			Slight chemical odor
-10						
	10-12' Golden brown gravelly sand	SP	108.8			Slight chemical odor
	12-14' Same	SP	42.8			Slight chemical odor
-15	14-16' Same	SP	84.2			Slight chemical odor
	16-18' Same	SP	129.7			Slight chemical odor
	18-20' No recovery	--	--			Slight chemical odor
-20						
	20-22' Brown medium-grained sand	SW	95.2			Slight chemical odor
	22-24' Brown medium-grained gravelly sand	SW	33.5			Slight chemical odor
-25						

NOTES

Liesch Associates, Inc.

Project:	GHJM - AEC Acquisition
Drilling Contractor:	New England Boring Contractors
Logged By:	Dan Larson
Date Start:	2/11/99
Date Finished:	2/11/99
E.O.B. (ft.)	57
Borehole Number:	MW-2
Location	Near SE Blvd.
Drilling Equipment:	Mobile drill B53
Driller:	Mike St. John & Brian Sullivan
Surface Elevation:	

Depth (Ft.)	Description of Material	USCS	PID	Geologic Origin	Samples	Notes
	25-27' Brown medium-grained sand	SP	45.1			Slight chemical odor
-30						
	30-32' Brown medium-grained gravelly sand	SP	8.0			Slight chemical odor
-35						
	35-37' Golden brown sandy gravel	SP	44.2			
-40						
	40-42' Golden brown medium grained gravelly sand	SP	30.9			
-45						
	45-47' Same	SP	8.2			
-50						
	50-52' Same	SP	112.6			Saturated

Monitoring well screen set @ 47-57'.

NOTES

Liesch Associates, Inc.

Project:	GHJM - AEC Acquisition
Drilling Contractor:	New England Boring Contractors
Logged By:	Dan Larson
Date Start:	2/11/99
Date Finished:	2/11/99
E.O.B. (ft.)	57
Borehole Number:	MW-3
Location	Near NW corner of building
Drilling Equipment:	Mobile drill B53
Driller:	Mike St. John & Brian Sullivan
Surface Elevation:	

Depth (Ft.)	Description of Material	USCS	PID	Geologic Origin	Samples	Notes
-	Asphalt surface					
-	2-4' Brown gravelly fine to medium-grained sand	SP	0.0			3" recovery
-5	4-6' Same		0.0			
-	6-8' No recovery					
-	8-10' Golden brown medium-grained gravelly sand	SP	0.0			
-10	10-12' Same	SP	0.0			
-	12-14' Same	SP	0.0			
-	14-16' Same	SP	0.0			
-15						
-						
-						
-						
-20						
-						
-						
-						
-						
-	24-26' Brown fine-grained gravelly sand	SP				
-25						

NOTES

Liesch Associates, Inc.

Project:	GHJM - AEC Acquisition
Drilling Contractor:	New England Boring Contractors
Logged By:	Dan Larson
Date Start:	2/11/99
Date Finished:	2/11/99
E.O.B. (ft.)	57
Borehole Number:	MW-3
Location	Near NW corner of building
Drilling Equipment:	Mobile drill B53
Driller:	Mike St. John & Brian Sullivan
Surface Elevation:	

Depth (Ft.)	Description of Material	USCS	PID	Geologic Origin	Samples	Notes
--30						
--35	34-36' Golden brown medium-grained gravelly sand		0.0			
--40						
--45	44-46' Same		1.6			
--50						
	50-52' Same		3.0			

NOTES

ERM-Northeast

175 Froehlich Farm Blvd., Woodbury, New York 11797

ERM

Boring Number
MW-4

BORING LOG

Project Name & Location: Johnson and Hoffman	Project Number:	Date & Time Started: 10/31/00 @09:00	
		Date & Time Completed: 10/31/00@12:00	
Drilling Company: Delta Well and Pump	Foreman: Charlie Blumberg	Sampler(s):	Sampler Hammer: 140 lbs / Drop: 30inches
Drilling Equipment: F-10 Drill Rig	Method: H.S.A.	Elevation & Datum:	Completion Depth: 56 feet / Rock Depth:
Bit Size(s): H.S.A 4.25 inch	Core Barrel(s): 1-3/8 inch	Geologist(s): Michael Mendes	

DEPTH (ft below grade)	SAMPLES: Sample Number	Recovery (feet)	FID/PID (ppm)	Blow Counts	SOIL DESCRIPTION	REMARKS
	LOCATION: Loading Bay area (asphalt)				SURFACE DESCRIPTION:	
0	NA	NA	0.0	NA	Brown Silty sand with gravel pebbles and cobbles.	Dry no odors
5			0.0			
10			0.0		10 to 12 ft Poorly sorted sand and gravel some sporadic rounded pebbles and iron staining	Dry no odors
15			0.0			
20			0.0		20 to 22 ft Fine to medium grained sand and gravel poorly sorted trace hematite iron staining present	Dry no odors
25			0.0			
30			0.0		30 to 32 ft Iron stained coarse to gravely sand, with some pebbles present. Trace hematite.	Dry no odors.
35			0.0			
40			0.0		40 to 42 ft Iron stained medium to coarse sand with some fine sands, trace gravels, trace pebbles.	Dry no odors.
45			0.0		45 to 47 ft Dry fine to medium sand some coarse gravel, trace pebbles.	
50					47 to 49 ft Groundwater encountered at 48 ft. fine to medium sand well sorted trace gravel.	Groundwater at 48 ft

Signature: _____ Date: _____

ERM-Northeast

175 Froehlich Farm Blvd., Woodbury, New York 11797

Boring Number
MW-4

BORING LOG

DEPTH (ft below grade)	SAMPLES: Sample Number	Recovery (feet)	FID/ PID (ppm)	Blow Counts	SOIL DESCRIPTION	REMARKS
50	NA	NA	0.0	NA	50 to 52 ft Fine to medim sand with some coarse sand and gravel. Saturated.	
55			0.0		55 Poorly sorted sands and gravel 56 ft is end of Boriing.	
60						

Page _____ of _____ Signature: _____ Date: _____

ERM-Northeast

175 Froehlich Farm Blvd., Woodbury, New York 11797

ERM

Boring Number
MW-5

BORING LOG

Project Name & Location: Johnson and Hoffman	Project Number:	Date & Time Started: 11/01/00 @ 08:30	
		Date & Time Completed: 11/01/00 @ 08:30	
Drilling Company: Delta Well and Pump	Foreman: Charlie Blumberg	Sampler(s):	Sampler Hammer: 140 lbs / Drop: 30inches
Drilling Equipment: F-10 Drill Rig	Method: H.S.A.	Elevation & Datum:	Completion Depth: 57 feet / Rock Depth:
Bit Size(s): H.S.A 4.25 inch	Core Barrel(s): 1-3/8 inch	Geologist(s): Michael Mendes	

DEPTH (ft below grade)	SAMPLES: Sample Number	Recovery (feet)	FID/PID (ppm)	Blow Counts	SOIL DESCRIPTION	REMARKS
	LOCATION: Grass field				SURFACE DESCRIPTION:	
0	NA	NA	0.0	NA	Brown Silty sand with gravel pebbles and cobbles.	Dry no odors
5			0.0			
10			0.0		10 to 12 ft Poorly sorted sand and gravel some sporadic rounded pebbles and iron staining	Dry no odors
15			0.0		15 to 17 ft Brown sand coarse to gravely sands with some fines. Some pebbles rounded up to one inch.	Dry no odors.
20			0.0		20 to 22 ft Fine to medium grained sand and gravel poorly sorted trace hematite iron staining present	Dry no odors
25			0.0			
30			0.0		30 to 32 ft Iron stained coarse to gravely sand, with some pebbles present. Trace hematite.	Dry no odors.
35			0.0			
40			0.0		40 to 42 ft Medium grained sand poorly sorted, with some coarse sand and gravels, some fines and pebbles	Dry no odors.
45			0.0		45 to 47 ft Dry fine to medium sand some coarse gravel, trace pebbles.	
50					47 to 49 ft Brown fine to medium sand, trace gravel trace coarse sand, iron staining present.	Groundwater at 48 ft

Signature: _____ Date: _____

ERM-Northeast

175 Froehlich Farm Blvd., Woodbury, New York 11797

Boring Number
MW-5

BORING LOG

DEPTH (ft below grade)	SAMPLES: Sample Number	SAMPLES: Recovery (feet)	SAMPLES: FID/PID (ppm)	SAMPLES: Blow Counts	SOIL DESCRIPTION	REMARKS
50	NA	NA	0	0	49 to 51 ft Brown sands poorly sorted, trace gravel and small pebbles. Iron staining present.	
					51 to 53 ft Groundwater encountered, brown fine to medium saturated sand with trace gravel and coarse.	
55			0		55 Poorly sorted sands and gravel. 57 ft is end of Boring.	
60						

Page _____ of _____ Signature: _____ Date: _____

CLIENT: LIESCH ASSOCIATES

PROJECT NAME: JOHNSON & HOFFMAN MANUFACTURING

LOCATION: CARLE PLACE, NY

DRILLER: M. St. John

INSPECTOR: D. Larson

DATE START: 2-10-99

DATE FINISH: 2-10-99

NEW ENGLAND BORING CONTRACTORS OF CT., INC.

129 KRIEGER LANE
GLASTONBURY, CT 06033
(860) 633-4649 -- (413) 733-1232
FAX (860) 657-8046

BORING No. MW-1

SHEET 1 OF 1

ARCHITECT/ ENGINEER

FILE NO. LIESCHJO

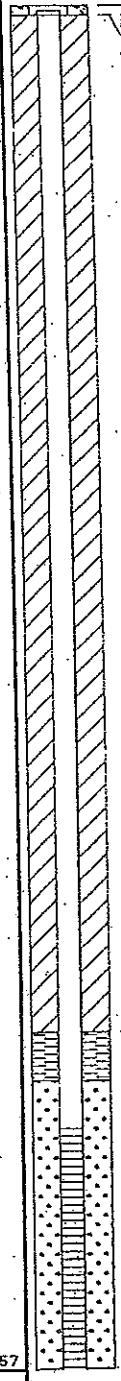
SURFACE ELEV.

LINE & STATION

OFFSET

	Casing	Sampler	Core Barrel
TYPE	HSA	SS	
SIZE I.D.	4-1/4"	1-3/8"	
HAMMER WT.		140	
HAMMER FALL		30"	

SAMPLE No.	DEPTH RANGE IN FEET	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	REC.	CASING BLOWS/ CORING TIMES PER FT.	FIELD CLASSIFICATION AND REMARKS	Well Cons.	Installation Details
S1	0'-2'	No Required Blows				20"		Topsoil 4		Roadway B
S2	2'-4'					18"		Brown Fine - Coarse Sand, Some Silt 1.5		47' of 2" P Riser
S3	4'-6'					14"		Brown Silt, Little Fine Sand 3		
S4	6'-8'					10"		Brown Fine - Coarse Sand, Some Fine - Coarse Gravel		
S5	8'-10'					14"				
S6	10'-12'					16"				
S7	12'-14'					18"				
S8	14'-16'					20"				
S9	16'-18'					20"				
S10	18'-20'					18"				
S11	25'-27'					15"				
S12	30'-32'					12"				
S13	40'-40'2"					0"				
S14	50'-52'					24"				



57

End of Boring @ 57'
Water @ 50'

Bottom @ 57'

NOTES:

1) The stratification lines represent the approximate boundary between soil types. Transitions may be gradual.

2) Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. Fluctuations in the level of groundwater may occur due to factors other than those present at the time measurements were made.

REMARKS:

CLIENT: LIESCH ASSOCIATES

PROJECT NAME: JOHNSON & HOFFMAN MANUFACTURING

LOCATION: CARLE PLACE, NY

DRILLER: M. St. John

INSPECTOR: D. Larson

DATE START: 2-10-99

DATE FINISH: 2-10-99

NEW ENGLAND BORING CONTRACTORS OF CT., INC.

129 KRIEGER LANE
GLASTONBURY, CT 06033
(860) 633-4649 -- (413) 733-1232
FAX (860) 657-8046

BORING No. MW-2

SHEET 1 OF 1

ARCHITECT/ ENGINEER

FILE NO. LIESCHJO

SURFACE ELEV.

LINE & STATION

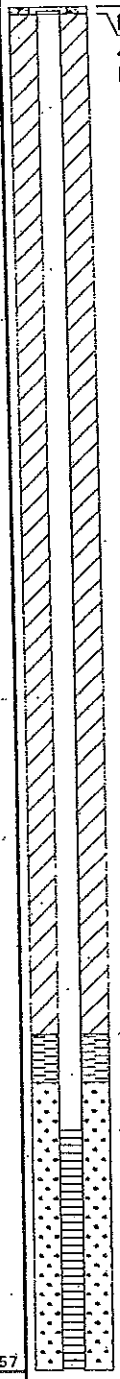
OFFSET

	Casing	Sampler	Core Barrel
TYPE	HSA	SS	
SIZE I.D.	4-1/4"	1-3/8"	
HAMMER WT.		140	
HAMMER FALL		30"	

SAMPLE No.	DEPTH RANGE IN FEET	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	REC.	CASING BLOWS/ CORING TIMES PER FT.	FIELD CLASSIFICATION AND REMARKS
S1	0'-2'	No Required Blows				18"		Topsoil
S2	2'-4'					16"		Brown Fine - Coarse Sand, Some Fine - Coarse Gravel, Little Silt
S3	4'-6'					14"		
S4	6'-8'					12"		
S5	8'-10'					12"		
S6	10'-12'					12"		
S7	12'-14'					18"		
S8	14'-16'					16"		
S9	16'-18'					14"		
S10	18'-20'					12"		
S11	20'-22'					10"		
S12	22'-24'					10"		
S13	25'-27'					14"		
S14	30'-32'					18"		
S15	35'-37'					16"		
S16	40'-42'					20"		
S17	45'-47'					18"		
S18	50'-52'					20"		

End of Boring @ 57'
Water @ 50'

Well Cons.



Installation Details

Roadway B

47' of 2" P Riser

2' Bentor Chip Seal

10' of .0 Slot, 2" Screen

NJ #2 Sa

Bottom o @ 57'

NOTES:

1) The stratification lines represent the approximate boundary between soil types. Transitions may be gradual.

2) Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. Fluctuations in the level of groundwater may occur due to factors other than those present at the time measurements were made.

REMARKS:

CLIENT: LIESCH ASSOCIATES

PROJECT NAME: JOHNSON & HOFFMAN MANUFACTURING

LOCATION: CARLE PLACE, NY

DRILLER: M. St. John

INSPECTOR: D. Larson

DATE START: 2-12-98

DATE FINISH: 2-12-98

NEW ENGLAND BORING CONTRACTORS OF CT., INC.

129 KRIEGER LANE
GLASTONBURY, CT 06033
(860) 633-4649. -- (413) 733-1232
FAX (860) 657-8046

BORING No. MW-

SHEET 1 OF 1

ARCHITECT/ ENGINEER

FILE NO. LIESCHJO

SURFACE ELEV.

LINE & STATION

OFFSET

	Casing	Sampler	Core Barrel
TYPE	HSA	SS	
SIZE I.D.	4-1/4"	1-3/8"	
HAMMER WT.		140	
HAMMER FALL		30"	

SAMPLE No.	DEPTH RANGE IN FEET	BLOWS PER 6" ON SAMPLER 0-6	6-12	12-18	18-24	REC.	CASING BLOWS/ CORING TIMES PER FT.	FIELD CLASSIFICATION AND REMARKS
S1	0'-2'	No Required Blows				10"		Asphalt 2
S2	2'-4'					8"		Brown Fine - Coarse Sand and Fine - Coarse Gravel, Little Silt
S3	4'-6'					12"		
S4	6'-8'					16"		
S5	8'-10'					18"		
S6	10'-12'					18"		
S7	12'-14'					12"		
S8	14'-16'					10"		
S9	16'-18'					18"		
S10	18'-20'					18"		
S11	25'-27'					20"		
S12	34'-36'					20"		
S13	44'-46'					18"		
S14	50'-52'					24"		57 End of Boring @ 57' Water @ 50'

Well Cons. / Installat Detail

NOTES:

1] The stratification lines represent the approximate boundary between soil types. Transitions may be gradual.

2] Water level readings have been made in the drill holes at times and under conditions stated on the boring logs. Fluctuations in the level of groundwater may occur due to factors other than those present at the time measurements were made.

REMARKS:

ERM-Northeast

WELL : MW-4

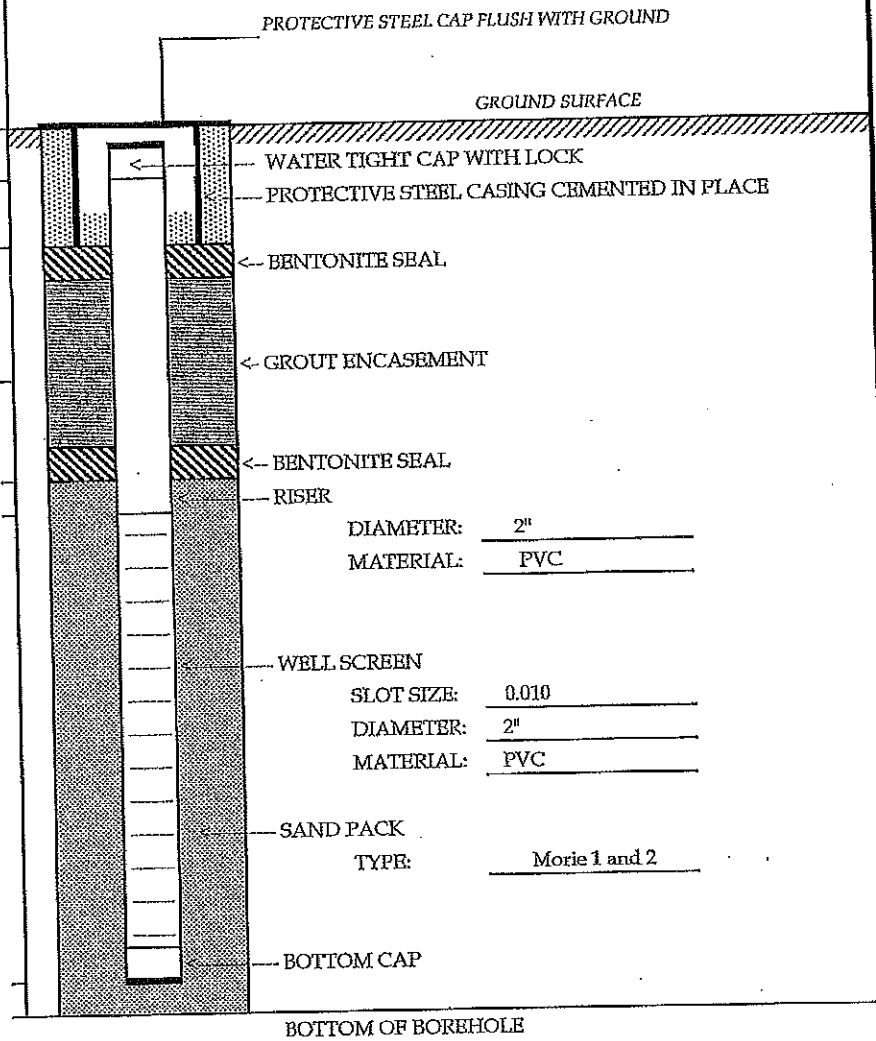
175 Froehlich Farm Blvd., Woodbury, NY 11797

MONITORING WELL CONSTRUCTION LOG

Project Name & Location **Johnson & Hoffman**	*Project No.*	*Water Level(s)* (ft below top of PVC casing)			*Site Elevation Datum (feet)*
Drilling Company Delta Well and Pump	*Foreman* Charlie Blumberg	Date	Time	Level (feet)	*Ground Elevation (feet)*
Surveyor		10/31/00	15:30	47.9	*Top of Protective Steel Cap Elevation (feet)*
Date and Time of Completion 10/31/00 @1500	*Geologist* Mike Mendes				*Top of Riser Pipe Elevation (feet)*

Generalized Soil Description	*Elevation	**Depth
	0.00	0.0
0 - 0.5 ft. Ashphalt	0.00	0.5
0.5 ft to 7 ft brown silty sand and gravel, rounded pebbles and cobbles also present. Dry and no odors	-2.00	2.0
7 to 20 ft is borwn, coarse to gravely sand with pebbles and cobbles. Iron staining present. Dry and no odors.	0.00	
	-44.00	44.0
	-46.00	46.0
20 to 56 ft Clean fine med. grained sand some gravel and rounded pebbles.		
Groundwater encountered at 48 ft below grade.		
	-56.00	56.0
	0.00	

CONSTRUCTION DETAILS



REMARKS _____

* Elevation (feet) above mean sea level unless noted

** Depth in feet below ground surface

C:\SFORMS\J&HWells.xls
rev. 9/96

ERM-Northeast

WELL : MW-5

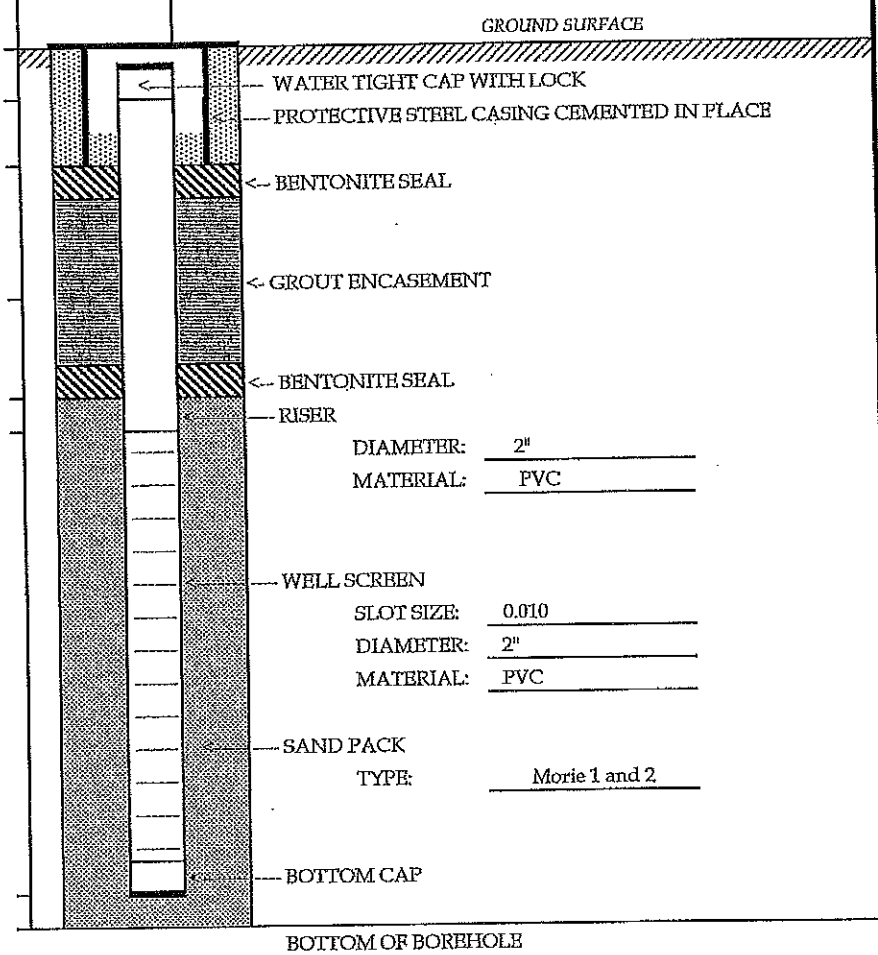
175 Froehlich Farm Blvd., Woodbury, NY 11797

MONITORING WELL CONSTRUCTION LOG

Project Name & Location	Project No.	Water Level(s) (ft below top of PVC casing)			Site Elevation Datum (feet)
Johnson & Hoffman		Date	Time	Level (feet)	Ground Elevation (feet)
Drilling Company: Delta Well and Pump	Foreman: Charlie Blumberg	10/31/00	14:00	52.0	Top of Protective Steel Cap Elevation (feet)
Surveyor					Top of Riser Pipe Elevation (feet)
Date and Time of Completion: 11/01/00 @1500	Geologist: Mike Mendes				

Generalized Soil Description	*Elevation	**Depth
	0.00	0.0
0.0 to 7.0 highly silty, poorly sorted sand, and gravel with pebbles and cobbles. Dry and no odors detected.	0.00	0.5
	-2.00	2.0
5 to 52 ft is borwn, fine med. and coarse sand with pebbles and cobbles. Iron staining present. Dry and no odors.	0.00	
	-45.00	45.0
52 to 57 ft is same as above groundwater encountered at 52 ft below grade. No odors detected at the water table.	-47.00	47.0
	-57.00	57.0
	0.00	

CONSTRUCTION DETAILS



REMARKS _____

* Elevation (feet) above mean sea level unless noted

** Depth in feet below ground surface

C:\SFORMS\J&HWells.xls
rev. 9/96

ERM Inc.

WELL : MW-06S

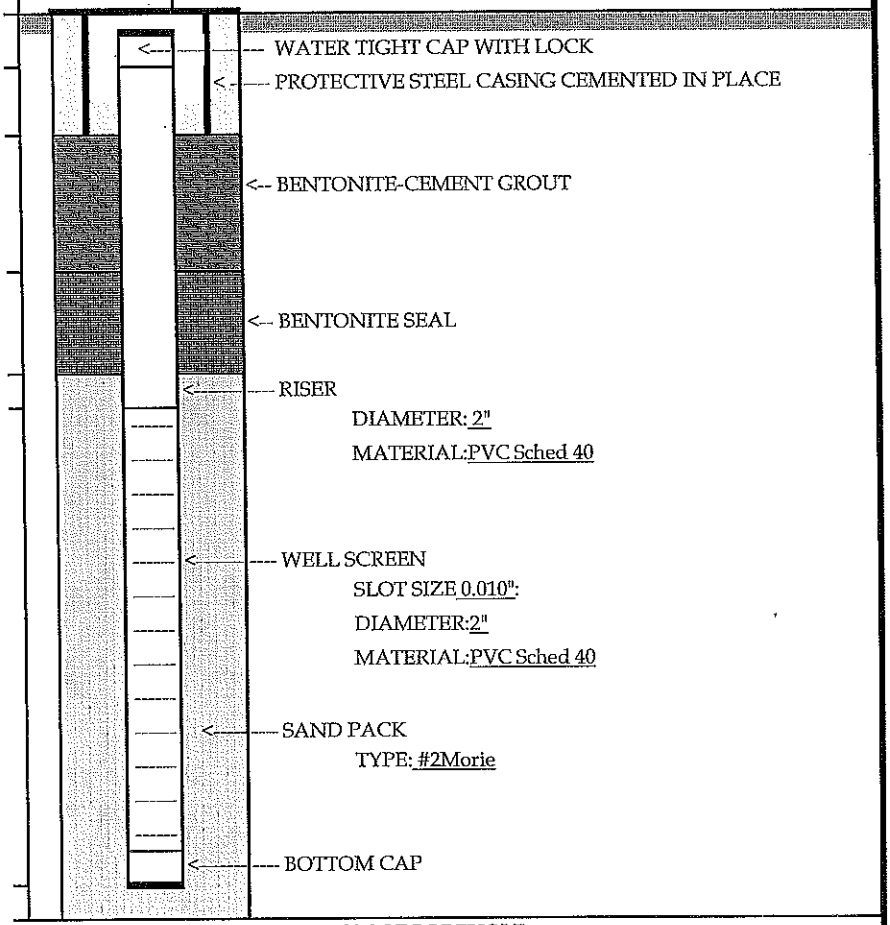
520 Broad Hollow Road, Suite 210, Melville, NY, 11747

MONITORING WELL CONSTRUCTION LOG

Project Name & Location	Project No.	Water Level(s) (ft below top of PVC casing)			Site Elevation Datum (feet)
J&H	40770				
Drilling Company	Foreman	Date	Time	Level (feet)	Ground Elevation (feet)
Delta Well and Pump	Pat				107.03
Surveyor		12/6/2007	900	42.2	Top of Protective Steel Cap Elevation (feet)
Date and Time of Completion	Geologist				Top of Riser Pipe Elevation (feet)
11/15/07 2100	Karen Pickering				

Generalized Soil Description	*Elevation	**Depth
	107.03	0.0
	106.53	0.5
Poorly Sorted, Silty M. and C. Sand, some gravel.	106.03	1.0
Poorly Sorted, M. and C. Sand, some F. sand and gravel.	45.03	62.0
	42.03	65.0
	32.33	74.7
Well Sorted, M. and F. sand, some C. sand.		
V. Well Sorted, M. and F. sand, trace C. sand.		
	22.33	84.7
	20.33	86.7

CONSTRUCTION DETAILS



REMARKS _____

* Elevation (feet) above mean sea level unless noted

** Depth in feet below ground surface

ERM Inc.

WELL : MW-06D

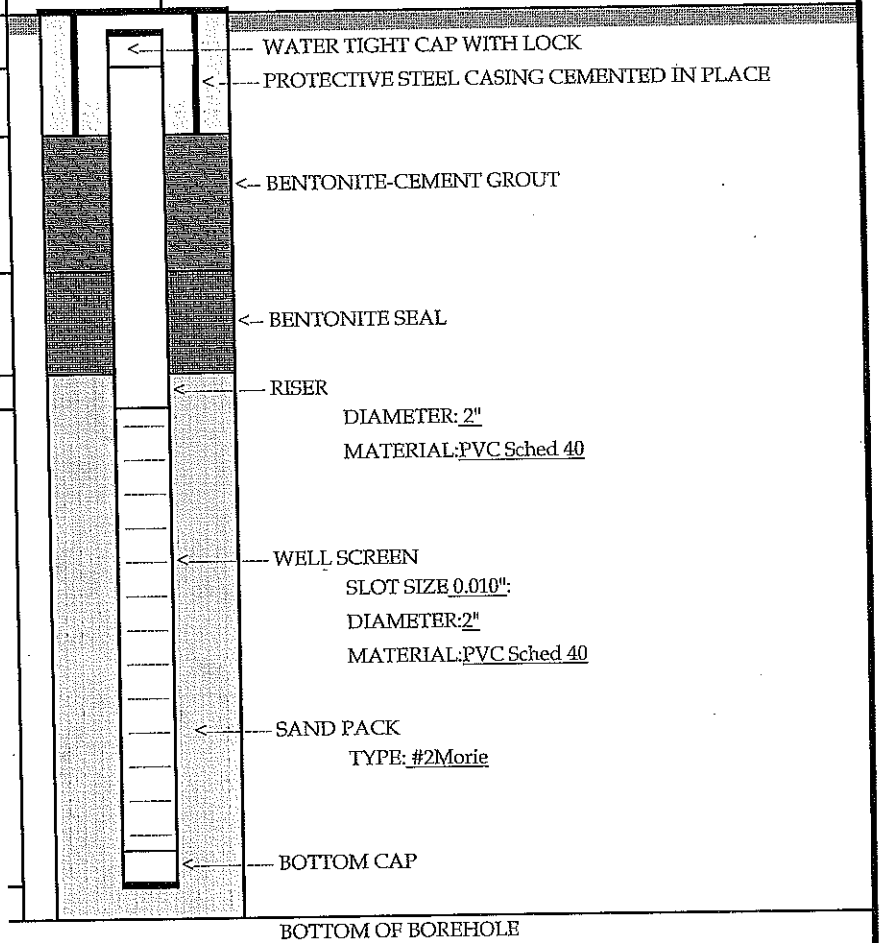
520 Broad Hollow Road, Suite 210, Melville, NY, 11747

MONITORING WELL CONSTRUCTION LOG

Project Name & Location	Project No.	Water Level(s) (ft below top of PVC casing)			Site Elevation Datum (feet)
J&H	40770				
Drilling Company	Foreman	Date	Time	Level (feet)	Ground Elevation (feet)
Delta Well and Pump	Pat				106.82
Surveyor		12/6/2007	900	46.8	Top of Protective Steel Cap Elevation (feet)
Date and Time of Completion	Geologist				Top of Riser Pipe Elevation (feet)
11/15/07 2100	Karen Pickering				

Generalized Soil Description	*Elevation	**Depth
	106.82	0.0
	106.32	0.5
M. F. and C. sands, some to trace gravel.	105.82	1.0
Same as above.	-0.18	107.0
	-3.18	110.0
Same as above.	-8.18	115.0
Same as above.	-18.18	125.0
	-19.68	126.5

CONSTRUCTION DETAILS



REMARKS

* Elevation (feet) above mean sea level unless noted

** Depth in feet below ground surface

APPENDIX D – EXCAVATION WORK PLAN (EWP)

D-1 NOTIFICATION

At least 15 days prior to the start of any activity that is anticipated to encounter remaining contamination, the site owner or their representative will notify the NYSDEC. The table below includes contact information for the above notification. The information on this table will be updated as necessary to provide accurate contact information. A full listing of site-related contact information is provided in Appendix B.

Notifications*

Girish Desai – NYSDEC Project Manager	631- 444-0243 girish.desai@dec.ny.gov
Walter Parish - NYSDEC Regional HW Engineer	(631) 444-0240 walter.parish@dec.ny.gov
Kelly Lewandowski - NYSDEC Site Control	518-402-9553 kelly.lewandowski@dec.ny.gov
Steven Karpinski - NYSDOH	(518) 402-7860, steven.karpinski@health.ny.gov

* Note: Notifications are subject to change and will be updated as necessary.

This notification will include:

- A detailed description of the work to be performed, including the location and areal extent of excavation, plans/drawings for site re-grading, intrusive elements or utilities to be installed below the soil cover, estimated volumes of contaminated soil to be excavated and any work that may impact an engineering control;
- A summary of environmental conditions anticipated to be encountered in the work areas, including the nature and concentration levels of contaminants of

concern, potential presence of grossly contaminated media, and plans for any pre-construction sampling;

- A schedule for the work, detailing the start and completion of all intrusive work;
- A summary of the applicable components of this EWP;
- A statement that the work will be performed in compliance with this EWP and 29 CFR 1910.120;
- A copy of the contractor's health and safety plan (HASP), in electronic format, if it differs from the HASP provided in Appendix G of this SMP;
- Identification of disposal facilities for potential waste streams; and
- Identification of sources of any anticipated backfill, along with all required chemical testing results.

D-2 SOIL SCREENING METHODS

Visual, olfactory and instrument-based (e.g. photoionization detector) soil screening will be performed by a qualified environmental professional during all excavations into known or potentially contaminated material (remaining contamination). Soil screening will be performed when invasive work is done and will include all excavation and invasive work performed during development, such as excavations for foundations and utility work, after issuance of the COC.

Soils will be segregated based on previous environmental data and screening results into material that requires off-site disposal and material that requires testing to determine if the material can be reused on-site as soil beneath a cover or if the material can be used as cover soil. Further discussion of off-site disposal of materials and on-site reuse is provided in Section E6 & E7 of this Appendix.

D-3 SOIL STAGING METHODS

Soil stockpiles will be continuously encircled with a berm and/or silt fence. Hay bales will be used as needed near catch basins, surface waters and other discharge points.

Stockpiles will be kept covered at all times with appropriately anchored tarps. Stockpiles will be routinely inspected and damaged tarp covers will be promptly replaced.

Stockpiles will be inspected at a minimum once each week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by the NYSDEC.

D-4 MATERIALS EXCAVATION AND LOAD-OUT

A qualified environmental professional or person under their supervision will oversee all invasive work and the excavation and load-out of all excavated material.

The owner of the property and remedial party (if applicable) and its contractors are responsible for safe execution of all invasive and other work performed under this Plan.

The presence of utilities and easements on the site will be investigated by the qualified environmental professional. It will be determined whether a risk or impediment to the planned work under this SMP is posed by utilities or easements on the site. A geophysical mark out is recommended to be performed prior to any excavation.

Loaded vehicles leaving the site will be appropriately lined, tarped, securely covered, manifested, and placarded in accordance with appropriate Federal, State, local, and NYSDOT requirements (and all other applicable transportation requirements).

A truck wash will be operated on-site, as appropriate. The qualified environmental professional will be responsible for ensuring that all outbound trucks will be washed at the truck wash before leaving the site until the activities performed under this section are

complete Truck wash waters will be collected and disposed of off-site in an appropriate manner.

Locations where vehicles enter or exit the site shall be inspected daily for evidence of off-site soil tracking.

The qualified environmental professional will be responsible for ensuring that all egress points for truck and equipment transport from the site are clean of dirt and other materials derived from the site during intrusive excavation activities. Cleaning of the adjacent streets will be performed as needed to maintain a clean condition with respect to site-derived materials.

D-5 MATERIALS TRANSPORT OFF-SITE

All transport of materials will be performed by licensed haulers in accordance with appropriate local, State, and Federal regulations, including 6 NYCRR Part 364. Haulers will be appropriately licensed and trucks properly placarded.

Material transported by trucks exiting the site will be secured with tight-fitting covers. Loose-fitting canvas-type truck covers will be prohibited. If loads contain wet material capable of producing free liquid, truck liners will be used.

All trucks loaded with site materials will exit the vicinity of the site using only approved truck routes. These routes take into account: (a) limiting transport through residential areas and past sensitive sites; (b) use of city mapped truck routes; (c) prohibiting off-site queuing of trucks entering the facility; (d) limiting total distance to major highways; (e) promoting safety in access to highways; and (f) overall safety in transport; (g) community input

Trucks will be prohibited from stopping and idling in the neighborhood outside the project site.

Egress points for truck and equipment transport from the site will be kept clean of dirt and other materials during site remediation and development.

Queuing of trucks will be performed on-site in order to minimize off-site disturbance. Off-site queuing will be prohibited.

D-6 MATERIALS DISPOSAL OFF-SITE

All material excavated and removed from the site will be treated as contaminated and regulated material and will be transported and disposed in accordance with all local, State (including 6NYCRR Part 360) and Federal regulations. If disposal of material from this site is proposed for unregulated off-site disposal (i.e. clean soil removed for development purposes), a formal request with an associated plan will be made to the NYSDEC. Unregulated off-site management of materials from this site will not occur without formal NYSDEC approval.

Off-site disposal locations for excavated soils will be identified in the pre-excavation notification. This will include estimated quantities and a breakdown by class of disposal facility if appropriate, i.e. hazardous waste disposal facility, solid waste landfill, petroleum treatment facility, C/D recycling facility, etc. Actual disposal quantities and associated documentation will be reported to the NYSDEC in the Periodic Review Report. This documentation will include: waste profiles, test results, facility acceptance letters, manifests, bills of lading and facility receipts.

Non-hazardous historic fill and contaminated soils taken off-site will be handled, at minimum, as a Municipal Solid Waste per 6NYCRR Part 360-1.2. Material that does not meet Unrestricted SCOs is prohibited from being taken to a New York State recycling facility (6NYCRR Part 360-16 Registration Facility).

D-7 MATERIALS REUSE ON-SITE

The qualified environmental professional will ensure that procedures defined for materials reuse in this SMP are followed and that unacceptable material does not remain on-site. Contaminated on-site material, including historic fill and contaminated soil, that is acceptable for reuse on-site will be placed below a demarcation layer or impervious surface, and will not be reused within a cover soil layer, within landscaping berms, or as backfill for subsurface utility lines.

Any demolition material proposed for reuse on-site will be sampled for asbestos and the results will be reported to the NYSDEC for acceptance. Concrete crushing or processing on-site will not be performed without prior NYSDEC approval. Organic matter (wood, roots, stumps, etc.) or other solid waste derived from clearing and grubbing of the site will not be reused on-site.

D-8 FLUIDS MANAGEMENT

All liquids to be removed from the site, including but not limited to, excavation dewatering, decontamination waters and groundwater monitoring well purge and development waters, will be handled, transported and disposed in accordance with applicable local, State, and Federal regulations. Dewatering, purge and development fluids will not be recharged back to the land surface or subsurface of the site, and will be managed off-site, unless prior approval is obtained from NYSDEC.

Discharge of water generated during large-scale construction activities to surface waters (i.e. a local pond, stream or river) will be performed under a SPDES permit.

D-9 COVER SYSTEM RESTORATION

After the completion of soil removal and any other invasive activities the cover system will be restored in a manner that complies with the Decision document. The existing

cover system is comprised of a minimum of 12 inches of clean soil, asphalt pavement, concrete covered sidewalks and concrete building, etc. If the type of cover system changes from that which exists prior to the excavation (i.e., a soil cover is replaced by asphalt), this will constitute a modification of the cover element of the remedy and the upper surface of the remaining contamination. A figure showing the modified surface will be included in the subsequent Periodic Review Report and in an updated SMP.

D-10 BACKFILL FROM OFF-SITE SOURCES

All materials proposed for import onto the site will be approved by the qualified environmental professional and will be in compliance with provisions in this SMP prior to receipt at the site. A Request to Import/Reuse Fill or Soil form, which can be found at http://www.dec.ny.gov/regulations/67386.html, will be prepared and submitted to the NYSDEC project manager allowing a minimum of 5 business days for review.

Material from industrial sites, spill sites, or other environmental remediation sites or potentially contaminated sites will not be imported to the site.

All imported soils will meet the backfill and cover soil quality standards established in 6NYCRR 375-6.7(d). Soils that meet 'exempt' fill requirements under 6 NYCRR Part 360, but do not meet backfill or cover soil objectives for this site, will not be imported onto the site without prior approval by NYSDEC. Solid waste will not be imported onto the site.

Trucks entering the site with imported soils will be securely covered with tight fitting covers. Imported soils will be stockpiled separately from excavated materials and covered to prevent dust releases.

D-11 STORMWATER POLLUTION PREVENTION

Excavation work is to be done in accordance with a Stormwater Pollution Prevention Plan that conforms to the requirements of the NYSDEC Division of Water guidelines and NYS regulations. The plan is to include the following procedures:

Barriers and hay bale checks will be installed and inspected once a week and after every storm event. Results of inspections will be recorded in a logbook and maintained at the site and available for inspection by the NYSDEC. All necessary repairs shall be made immediately.

Accumulated sediments will be removed as required to keep the barrier and hay bale check functional.

All undercutting or erosion of the silt fence toe anchor shall be repaired immediately with appropriate backfill materials.

Manufacturer's recommendations will be followed for replacing silt fencing damaged due to weathering.

Erosion and sediment control measures identified in the SMP shall be observed to ensure that they are operating correctly. Where discharge locations or points are accessible, they shall be inspected to ascertain whether erosion control measures are effective in preventing significant impacts to receiving waters.

Silt fencing or hay bales will be installed around the entire perimeter of the construction area.

D-12 EXCAVATION CONTINGENCY PLAN

If underground tanks or other previously unidentified contaminant sources are found during post-remedial subsurface excavations or development related construction, excavation activities will be suspended until sufficient equipment is mobilized to address the condition.

Sampling will be performed on product, sediment and surrounding soils, etc. as necessary to determine the nature of the material and proper disposal method. Chemical analysis will be performed for a full list of analytes (TAL metals; TCL volatiles and semi-volatiles, TCL pesticides and PCBs), unless the site history and previous sampling results provide a sufficient justification to limit the list of analytes. In this case, a reduced list of analytes will be proposed to the NYSDEC for approval prior to sampling.

Identification of unknown or unexpected contaminated media identified by screening during invasive site work will be promptly communicated by phone to NYSDEC's Project Manager. Reportable quantities of petroleum product will also be reported to the NYSDEC spills hotline. These findings will be also included in the Periodic Review Report.

D-13 COMMUNITY AIR MONITORING PLAN

Any excavation work must be performed in accordance with the Community Air Monitoring Plan. Guidance can be found in Appendix 1A of DER-10, Generic Community Air Monitoring Plan. At a minimum all work must have an upwind and down station that monitors for particulate and vapors with action levels of 100 mc/m^3 and 5 ppm above background respectively. Meters must be capable of reporting 15-minute averages and have an audible alarm.

Due to the variability of the prevailing winds at the Site air sampling station locations will be adjusted on a daily or more frequent basis based on actual wind directions to provide an upwind and at least two downwind monitoring stations.

Exceedances of action levels listed in the CAMP will be reported to NYSDEC and NYSDOH Project Managers.

D-14 ODOR CONTROL PLAN

This odor control plan is capable of controlling emissions of nuisance odors off-site. Specific odor control methods to be used on a routine basis will be through limiting areas of open excavation. If nuisance odors are identified at the site boundary, or if odor

complaints are received, work will be halted and the source of odors will be identified and corrected. Work will not resume until all nuisance odors have been abated. NYSDEC and NYSDOH will be notified of all odor events and of any other complaints about the project. Implementation of all odor controls, including the halt of work, is the responsibility of the remedial party's Remediation Engineer, and any measures that are implemented will be discussed in the Periodic Review Report.

All necessary means will be employed to prevent on- and off-site nuisances. At a minimum, these measures will include: (a) limiting the area of open excavations and size of soil stockpiles; (b) shrouding open excavations with tarps and other covers; and (c) using foams to cover exposed odorous soils. If odors develop and cannot be otherwise controlled, additional means to eliminate odor nuisances will include: (d) direct load-out of soils to trucks for off-site disposal; (e) use of chemical odorants in spray or misting systems; and, (f) use of staff to monitor odors in surrounding neighborhoods.

If nuisance odors develop during intrusive work that cannot be corrected, or where the control of nuisance odors cannot otherwise be achieved due to on-site conditions or close proximity to sensitive receptors, odor control will be achieved by sheltering the excavation and handling areas in a temporary containment structure equipped with appropriate air venting/filtering systems.

D-15 DUST CONTROL PLAN

A dust suppression plan that addresses dust management during invasive on-site work will include, at a minimum, the items listed below:

- Dust suppression will be achieved though the use of a dedicated on-site water truck for road wetting. The truck will be equipped with a water cannon capable of spraying water directly onto off-road areas including excavations and stockpiles.
- Clearing and grubbing of larger sites will be done in stages to limit the area of exposed, unvegetated soils vulnerable to dust production.

- Gravel will be used on roadways to provide a clean and dust-free road surface.
- On-site roads will be limited in total area to minimize the area required for water truck sprinkling.

D-16 OTHER NUISANCES

A plan for rodent control will be developed and utilized by the contractor prior to and during site clearing and site grubbing, and during all remedial work.

A plan will be developed and utilized by the contractor for all remedial work to ensure compliance with local noise control ordinances.

APPENDIX E

Field Sampling Standard Operating Procedures

APPENDIX E
STANDARD OPERATING PROCEDURES

Johnson & Hoffman Manufacturing Site
Carle Place, New York
NYSDEC Site No. V-00684

February 2018

Prepared for:

Manley Holdings, Inc.
CAWSL Enterprises, Inc.
Ansaco Properties One LLC

Prepared by:

Environmental Resources Management
105 Maxess Road, Suite 316
Melville, New York 11747

TABLE OF CONTENTS

SOP 1: WATER LEVEL MEASUREMENT PROCEDURE

Groundwater elevation measurements are to be obtained using the following general procedures whenever depth to groundwater or groundwater elevation data is required. This may include activities such as soil borings, groundwater monitoring well installation/development, groundwater monitoring well sampling, and/or synoptic groundwater level measurements. The measurements will be collected concurrent with the groundwater sampling event and the water levels will be obtained prior to well evacuation and sample collection. The static water level will be measured to the nearest 0.01 foot.

(1) Clean all water-level measuring equipment using appropriate decontamination procedures.

(2) Remove locking well cap, note weather, time of day, and date, etc. in field notebook, or on an appropriate form.

(3) Remove well casing cap.

(4) Monitor headspace of well with a PID to determine presence of VOCs, and record in field notebook.

(5) Lower water level measuring device into well until the water surface is encountered.

(6) Measure distance from water surface to reference measuring point on well casing, and record in field notebook.

NOTE: if water level measurement is from either the top of protective steel casing, top of PVC riser pipe, from ground surface, or some other position on the wellhead.

(7) Measure total depth of well and record in field notebook or on log form.

(8) Remove all downhole equipment; replace well casing cap and locking steel caps.

(9) Calculate elevation of water:

Ew = E - D
Where
Ew = Elevation of Water
E = Elevation at point of measurement
D = Depth to Water

SOP 2: LOW FLOW GROUNDWATER SAMPLING

Install Pump

Lower pump, safety cable, tubing and electrical lines slowly (to minimize disturbance) into the well to the appropriate depth (may not be the mid-point of the screen/open interval). The Sampling and Analysis Plan/Quality Assurance Project Plan should specify the sampling depth (used previously), or provide criteria for selection of intake depth for each new well. If possible, keep the pump intake at least two feet above the bottom of the well, to minimize mobilization of particulates present in the bottom of the well.

Pump tubing lengths, above the top of well casing should be kept as short as possible to minimize heating the groundwater in the tubing by exposure to sun light and ambient air temperatures. Heating may cause the groundwater to degas, which is unacceptable for the collection of samples for VOC and dissolved gases analyses.

Measure Water Level

Before starting pump, measure water level. Install recording pressure transducer, if used to track drawdowns, to initialize starting condition.

Purge Well

From the time the pump starts purging and until the time the samples are collected, the purged water is discharged into a graduated bucket to determine the total volume of groundwater purged. This information is recorded on the purge form or in the field logbook.

Start the pump at low speed and slowly increase the speed until discharge occurs. Check water level. Check equipment for water leaks and if present fix or replace the affected equipment. Try to match pumping rate used during previous sampling event(s). Otherwise, adjust pump speed until there is little or no water level drawdown. If the minimal drawdown that can be achieved exceeds 0.3 feet, but remains stable, continue purging.

Monitor and record the water level and pumping rate every five minutes (or as appropriate) during purging. Record any pumping rate adjustments (both time and flow rate). Pumping rates should, as needed, be reduced to the minimum capabilities of the pump to ensure stabilization of the water level. Adjustments are best made in the first fifteen minutes of pumping in order to help minimize purging time. During pump start-up, drawdown may exceed the 0.3 feet target and then "recover" somewhat as pump flow adjustments are made. Purge volume calculations should utilize stabilized drawdown value, not the initial drawdown. If the initial water level is above the top of the screen do not allow the water level to fall into the well

screen. The final purge volume must be greater than the stabilized drawdown volume plus the pump's tubing volume. If the drawdown has exceeded 0.3 feet and stabilizes, calculate the volume of water between the initial water level and the stabilized water level. Add the volume of the water which occupies the pump's tubing to this calculation. This combined volume of water needs to be purged from the well after the water level has stabilized before samples are collected.

Avoid the use of constriction devices on the tubing to decrease the flow rate because the constrictor will cause a pressure difference in the water column. This will cause the groundwater to degas and result in a loss of VOCs and dissolved gasses in the groundwater samples.

Note: the flow rate used to achieve a stable pumping level should remain constant while monitoring the indicator parameters for stabilization and while collecting the samples.

Wells with low recharge rates may require the use of special pumps capable of attaining very low pumping rates (e.g., bladder, peristaltic), and/or the use of dedicated equipment. For new monitoring wells, or wells where the following situation has not occurred before, if the recovery rate to the well is less than 50 mL/min., or the well is being essentially dewatered during purging, the well should be sampled as soon as the water level has recovered sufficiently to collect the volume needed for all anticipated samples. The project manager or field team leader will need to make the decision when samples should be collected, how the sample is to be collected, and the reasons recorded on the purge form or in the field logbook. A water level measurement needs to be performed and recorded before samples are collected. If the project manager decides to collect the samples using the pump, it is best during this recovery period that the pump intake tubing not be removed, since this will aggravate any turbidity problems. Samples in this specific situation may be collected without stabilization of indicator field parameters. Note that field conditions and efforts to overcome problematic situations must be recorded in order to support field decisions to deviate from normal procedures described in this SOP. If this type of problematic situation persists in a well, then water sample collection should be changed to a passive or no-purge method, if consistent with the site's DQOs, or have a new well installed.

Monitor Indicator Field Parameters

After the water level has stabilized, connect the "T" connector with a valve and the flow-through-cell to monitor the indicator field parameters. If excessive turbidity is anticipated or encountered with the pump startup, the well may be purged for a while without connecting up the flow-through-cell, in order to minimize particulate buildup in the cell (This is a

judgment call made by the sampler). Water level drawdown measurements should be made as usual. If possible, the pump may be installed the day before purging to allow particulates that were disturbed during pump insertion to settle.

During well purging, monitor indicator field parameters (turbidity, temperature, specific conductance, pH, ORP, DO) at a frequency of five minute intervals or greater. The pump's flow rate must be able to "turn over" at least one flow-through-cell volume between measurements (for a 250 mL flow-through-cell with a flow rate of 50 mLs/min., the monitoring frequency would be every five minutes; for a 500 mL flow-through-cell it would be every ten minutes). If the cell volume cannot be replaced in the five minute interval, then the time between measurements must be increased accordingly. Note: during the early phase of purging, emphasis should be put on minimizing and stabilizing pumping stress, and recording those adjustments followed by stabilization of indicator parameters. Purging is considered complete and sampling may begin when all the above indicator field parameters have stabilized. Stabilization is considered to be achieved when three consecutive readings are within the following limits:

- **Turbidity** (10% for values greater than 5 NTU; if three Turbidity values are less than 5 NTU, consider the values as stabilized),
- **Dissolved Oxygen** (10% for values greater than 0.5 mg/L, if three Dissolved Oxygen values are less than 0.5 mg/L, consider the values as stabilized),
- **Specific Conductance** (3%),
- **Temperature** (3%),
- **pH** (± 0.1 unit),
- **Oxidation/Reduction Potential** (±10 millivolts).

All measurements, except turbidity, must be obtained using a flow-through-cell. Samples for turbidity measurements are obtained before water enters the flow-through-cell. Transparent flow-through-cells are preferred, because they allow field personnel to watch for particulate build-up within the cell. This build-up may affect indicator field parameter values measured within the cell. If the cell needs to be cleaned during purging operations, continue pumping and disconnect cell for cleaning, then reconnect after cleaning and continue monitoring activities. Record start and stop times and give a brief description of cleaning activities.

The flow-through-cell must be designed in a way that prevents gas bubble entrapment in the cell. Placing the flow-through-cell at a 45 degree angle with the port facing upward can help remove bubbles from the flow-through-cell (see Appendix B Low-Flow Setup Diagram). Throughout the measurement process, the flow-through-cell must remain free of any gas

bubbles. Otherwise, the monitoring probes may act erratically. When the pump is turned off or cycling on/off (when using a bladder pump), water in the cell must not drain out. Monitoring probes must remain submerged in water at all times.

Collect Water Samples

When samples are collected for laboratory analyses, the pump's tubing is disconnected from the "T" connector with a valve and the flow-through-cell. The samples are collected directly from the pump's tubing. Samples must not be collected from the flow-through-cell or from the "T" connector with a valve.

VOC samples are normally collected first and directly into pre-preserved sample containers. However, this may not be the case for all sampling locations; the SAP/QAPP should list the order in which the samples are to be collected based on the project's objective(s). Fill all sample containers by allowing the pump discharge to flow gently down the inside of the container with minimal turbulence.
If the pump's flow rate is too high to collect the VOC/dissolved gases samples, collect the other samples first. Lower the pump's flow rate to a reasonable rate and collect the VOC/dissolved gases samples and record the new flow rate.

During purging and sampling, the centrifugal/peristaltic pump tubing must remain filled with water to avoid aeration of the groundwater. It is recommended that 1/4 inch or 3/8 inch (inside diameter) tubing be used to help ensure that the sample tubing remains water filled. If the pump tubing is not completely filled to the sampling point, use the following procedure to collect samples: collect non-VOC/dissolved gases samples first, then increase flow rate slightly until the water completely fills the tubing, collect the VOC/dissolved gases samples, and record new drawdown depth and flow rate.

For bladder pumps that will be used to collect VOC or dissolved gas samples, it is recommended that the pump be set to deliver long pulses of water so that one pulse will fill a 40 mL VOC vial.

Use pre-preserved sample containers or add preservative, as required by analytical methods, to the samples immediately after they are collected. Check the analytical methods(e.g. EPA SW-846, 40 CFR 136, water supply, etc.) for additional information on preservation.

If determination of filtered metal concentrations is a sampling objective, collect filtered water samples using the same low flow procedures. The use of an in-line filter (transparent housing preferred) is required, and the filter size (0.45 µm is commonly used) should be based on the sampling

objective. Pre-rinse the filter with groundwater prior to sample collection. Make sure the filter is free of air bubbles before samples are collected. Preserve the filtered water sample immediately. Note: filtered water samples are not an acceptable substitute for unfiltered samples when the monitoring objective is to obtain chemical concentrations of total mobile contaminants in groundwater for human health or ecological risk calculations.

Label each sample as collected. Samples requiring cooling will be placed into a cooler with ice or refrigerant for delivery to the laboratory. Metal samples after acidification to a pH less than 2 do not need to be cooled.

DECONTAMINATION

Decontaminate sampling equipment prior to use in the first well, and then following sampling of each subsequent well. Pumps should not be removed between purging and sampling operations. The pump, tubing, support cable and electrical wires, which were in contact with the well should be decontaminated by the procedures listed below.

Decontaminating solutions can be pumped from either buckets or short PVC casing sections through the pump and tubing. The pump may be disassembled and flushed with the decontaminating solutions. It is recommended that detergent and alcohol be used sparingly in the decontamination process and water flushing steps be extended to ensure that any sediment trapped in the pump is removed. The pump exterior and electrical wires must be rinsed with the decontaminating solutions, as well. The procedure is as follows:

1) Flush the equipment/pump with potable water.

2) Flush with non-phosphate detergent solution. If the solution is recycled, the solution must be changed periodically.

3) Flush with potable or distilled/deionized water to remove all of the detergent solution. If the water is recycled, the water must be changed periodically.

4) Optional - flush with isopropyl alcohol (pesticide grade; must be free of ketones {e.g., acetone}) or with methanol. This step may be required if the well is highly contaminated or if the equipment blank data from the previous sampling event show that the level of contaminants is significant.

5) Flush with distilled/deionized water. This step must remove all traces of alcohol (if used) from the equipment. The final water rinse must not be recycled.

Fill out field notebook, Well Sample Log Sheet, labels, Custody Seals and Chain-of-Custody forms.

PURGE WATER CONTAINMENT AND DISPOSAL

Purge water will be handled in accordance with all applicable State and Federal regulations for handling and disposal of solid and liquid investigative derived waste (IDW).

Purge water will be containerized in 55-gallon drums and stored on-Site until disposal. Analytical results of the samples collected from the groundwater monitoring wells and/or composite water samples from the 55-gallon drums will determine the ultimate disposition of the purge water.

SOP 3: SOIL VAPOR SAMPLING USING SUMMA® CANISTERS

To correlate indoor air sampling results with a corresponding soil gas concentration underneath a structure, soil vapor samples will be collected from beneath the slab. The soil vapor samples will be collected at each location concurrently with the other indoor air samples in the building. The soil vapor samples will be collected through a temporary sampling port using SUMMA® canisters equipped with timed sample acquisition regulators. The canisters and regulators will be certified clean by the laboratory prior to onsite use. A NYSDOH ELAP-certified laboratory will analyze each sample for the specified VOCs using United States Environmental Protection Agency (USEPA) Method TO-15. Specific details are presented below.

Selection and Preparation of Sample Collection Point

- Observe the condition of the building floor slab for apparent penetrations such as concrete floor cracks, floor drains, or sump holes. Note the floor conditions on the sampling form and select a potential location or locations for a temporary or permanent subsurface probe.
- Using the PID, screen indoor air in the area of floor penetrations such as concrete floor cracks, floor drains, or sump holes (note that the detection limits for the laboratory analyses to be performed on the samples collected are considerably lower than the detection limits of the PID). Record the indoor air PID readings on the sampling form.

Preparation of SUMMA® Canister and Collection of Sample

- Place SUMMA® canister adjacent to temporary or permanent subsurface probe.
- Record SUMMA® canister serial number on sampling summary form and COC.
- Assign sample identification on canister ID tag, and record on sampling summary form and COC.
- Remove brass plug from canister fitting.
- Install pressure gage / metering valve on canister valve fitting and tighten. If pressure gage has additional (2nd) fitting, install brass plug from canister fitting into gage fitting and tighten.
- Open and close canister valve.
- Record gage pressure on sample summary form and COC. Gage pressure must read >25 inches Hg. Replace SUMMA® canister if gage pressure reads <25 inches Hg.
- Remove brass plug from gage fitting and store for later use.
- Install particulate filter onto metering valve input fitting and tighten.

- Connect subsurface probe to end of in-line particular filter via 1/4-inch O.D. Teflon™ tubing, or Teflon™ lined tubing, and "swagelok® -type" fittings.
- Open canister valve and in-line stainless steel valve to initiate sample collection.
- Take digital photograph of SUMMA® canister set up and surrounding area.
- Record date and local time (24-hour basis) of valve opening on sampling summary form and COC.

Termination of Sample Collection

- Revisit SUMMA® canister at the end of each sampling day and approximately after 80% of sample collection time has elapsed to verify sufficient amount of vacuum pressure remains for sample collection and shipment. If vacuum pressure no longer exists, or if vacuum pressure is <5 inches Hg, close the canister valve and document conditions. At end of sample collection record gage pressure on sampling form and COC.
- Record date and local time (24-hour basis) of valve closing on sampling summary form and COC.
- Close canister valve.
- Disconnect Teflon™ tubing and remove particulate filter and pressure gage / metering valve from canister.
- Reinstall brass plug on canister fitting and tighten.
- Remove SUMMA® canister from sample collection area.
- Remove temporary subsurface probe and plug the slab probe hole with solid laboratory grade rubber plug. Set plug slightly below the finished floor level cover flush with the floor surface using quick drying hydraulic cement.

Preparation and Shipment of Sample to Analytical Laboratory

- Pack SUMMA® canister in shipping container, note presence of brass plug installed in tank fitting.
- Complete COC and place requisite copies in shipping container.
- Close shipping container and affix custody seal to container closure.
- Zone A-1: Air sample obtained from crawl space or basement without an apparent vapor barrier.

SOP 4: INDOOR AIR SAMPLING USING SUMMA® CANISTERS

Indoor air samples will be collected from designated areas within the Site building. The indoor air samples will be collected at each location concurrently with sub-slab samples. The indoor air samples will be collected using SUMMA® canisters equipped with timed sample acquisition regulators. The canisters and regulators will be certified clean by the laboratory prior to onsite re-use. A NYSDOH ELAP-certified laboratory will analyze each sample for the specified VOCs using United States Environmental Protection Agency (USEPA) Method TO-15. General details are presented below.

1. Prior to sampling, and if possible, sources of VOCs will be removed from the sampling area. A PID will be used to help identify VOCs in indoor air.

2. The location of the sample will be marked, documented, and photographed. A Sample identification label will be visible in each photograph. In addition, a measuring device will be visible in each photograph to show that indoor ambient air sample intake valves are located between three and five-feet from the floor.

3. An initial PID reading will be made at the location of each air sample.

4. The SUMMA® canister will be attached to a sampling regulator set to collect a soil vapor sample over an 8-hour period (sample collection time interval may be changed at the discretion of the NYSDEC Project Manager). At the end of each day and after approximately 80% of the specified sample collection time has elapsed, the canister will be checked to ensure substantial vacuum pressure remains in the canister for sample collection and shipment.

5. For each indoor sample location, all the pertinent data will be recorded in the field forms. Additional general information will be recorded within a field book(s) designated to the project. This information should include the following:

   - Sampler's name;
   - Date, time and PID reading;
   - Date and time of sample start and stop;
   - SUMMA® canister serial number;
   - Survey location number, and descriptive location of the sampling area;
   - Sample identification for corresponding outdoor air samples
   - Weather conditions;
   - Barometric pressure;

- Initial SUMMA® canister pressure; and
- Final SUMMA® canister pressure.

Preparation of SUMMA® Canister and Collection of Sample

- Place SUMMA® canister at height equivalent to approximately the breathing zone of the ground story level of a building (e.g., approximately 5 feet above the ground surface). Position canister on stable surface, or suspend from stable structure with nylon rope. The canister inlet should be protected from precipitation (rain, ice, or snow) either by pointing the inlet downward or by shielding the top of the canister.
- Record SUMMA® canister serial number on sampling summary form and COC.
- Assign sample identification on canister ID tag, and record on sampling summary form and COC.
- Remove brass plug from canister fitting.
- Install pressure gage / metering valve on canister valve fitting and tighten. If pressure gage has additional (2nd) fitting, install brass plug from canister fitting into gage fitting and tighten.
- Open and close canister valve.
- Record gage pressure on sample summary form and COC. Gage pressure must read >25 inches Hg. Replace SUMMA® canister if gage pressure reads <25 inches Hg.
- Remove brass plug from gage fitting and store for later use.
- Install particulate filter onto metering valve input fitting and tighten.
- Open canister valve to initiate sample collection.
- Record local time on sampling summary form and COC.
- Take digital photograph of SUMMA® canister and surrounding area.

Termination of Sample Collection

- Revisit SUMMA® canister at the end of each sampling day and approximately after 80% of sample collection time has elapsed to verify sufficient amount of vacuum pressure remains for sample collection and shipment. If vacuum pressure no longer exists, or if vacuum pressure is <5 inches Hg, close the canister valve and document conditions. At end of sample collection period (e.g., 24 hours after initiation of sample collection) record gage pressure on sampling form and COC.
- Record local time on sampling summary and COC.
- Close canister valve.
- Remove particulate filter and pressure gage / metering valve from canister.
- Reinstall brass plug on canister fitting and tighten.

- Remove SUMMA® canister from sample collection area.
- Preparation and shipment of sample to analytical laboratory will follow the procedure below.
- Pack SUMMA® canister in shipping container, note presence of brass plug installed in tank fitting.
- Complete COC and place requisite copies in shipping container.
- Close shipping container and affix custody seal to container closure.

SOP 5: SUBSURFACE CLEARANCE PROCEDURES

Prior to performing any intrusive work the entity responsible for the work shall conduct a public and private utility markout, and fill out the attached Field Process Checklist.

Subsurface Clearance Field Process Checklist

Site Name: _____

Client: _____

ERM Project No.: _____

SSC Exp. Person: _____

Project Basics	Yes	No	N/A	Comments
Contact Person requested and identified				
Subcontractors meet ERM's minimum safety criteria				
Subcontractors understand their role in the SSC Process				
SSC Experienced Person with current SSC training assigned				
Project staff with current SSC training assigned				
UXO / MEC risks assessed: UXO / MEC IS NOT present				

General Field Activity & Site Walk	Yes	No	N/A	Comments
HASP read, understood and signed by project team				
Site walk Visual Clues / site features (below) integrated into Site Services Model				

Identified Visual Clue	Yes	No		Identified Visual Clue	Yes	No
Lights				Pipeline markers		
Signage				Fire hydrants		
Sewer drains / cleanouts				Sprinkler systems		
Cable markers				Water meters		
Utility poles with conduit leading to the ground				Natural gas meters		
Utility boxes				UST fill ports and vent pipes		
Manholes				Steam lines		
Pavement scarring				Remote buildings with no visible utilities		

Comments / Others:

Contact Person Approval of Ground Disturbance Locations (indicate verbal approval by printing "Verbal" in the signature space)

Name (Print)	Company	Name (Sign)	Date / Time

Pre-Clearance	Yes	No	N/A	Comments
Public Utility Markout completed				
Private Utility Markout completed				
Final Critical Zone determinations made by the SSC Experienced Person				

Critical Zones

Are there any ground disturbance locations <u>known</u> or <u>suspected</u> to be inside Critical Zones?

☐ **Yes.** PIC must approve work within the Critical Zone. The SSC Location Disturbance Permit or equivalent is required for those locations.

☐ **No.** Physical Clearance will proceed to the deeper of: 0.6m / 2 feet below the frost line or 1.2m / 4 feet below ground level, whichever is deeper.

Clearance for Point Disturbances	Yes	No	N/A	Comments
Adequate overhead clearance at ground disturbance locations				
There are disturbance locations known or suspected to be inside Critical Zones				
Physical Clearance successfully completed at all locations				

Clearance for Excavations	Yes	No	N/A	Comments
Adequate overhead clearance at ground disturbance locations				
Communicate excavation plan and Excavation Buffer location(s) to subcontractor				
There are disturbance locations known or suspected to be inside Critical Zones				
De-energize below ground services prior to beginning excavation				

SSC Process Completed By (SSC Experienced Person)

Name (Print)	Name (Sign)	Date / Time

APPENDIX F
Quality Assurance Project Plan

TABLE 1
DEFINITIONS OF DATA QUALITY PARAMETERS

- **Precision** - a measure of the reproducibility of measurements under a given set of conditions.
- **Accuracy** - a measure of the bias that exists in a measurement system.
- **Representativeness** - the degree to which sample data accurately and precisely represent selected characteristics.
- **Completeness** - a measure of the amount of the valid data obtained from the measurement system compared to the amount that is required.
- **Comparability** - a measure of confidence with which one data set can be compared with another.

TABLE 2
QUALITY CONTROL (QC) CHECK SUMMARY

Quality Control (QC) Checks	*Minimum Frequency*
Field Blank (FB)	1 per matrix per parameter per day of sample collection (minimum 5% frequency)
Trip Blank (TB)	1 per cooler (volatiles only)
Blind Field Duplicate (DUP)	1 per matrix per parameter per 20 samples
Surrogate Compound Spike	Every analytical run
Matrix Spike (MS)	1 per matrix per 20 samples or SDG [1]
Matrix Spike Duplicate (MSD)	1 per matrix per 20 samples or SDG (organics only)
Laboratory Control Sample (LCS) or Blank Spike Sample (BS)	1 per analytical batch not to exceed 20 samples
Method (Preparation) Blank (MB)	1 per 20 samples or prep/analysis batch per SDG
Internal Standard	Every analytical run

Notes:

1. Sample Delivery Group.

TABLE 3
SUMMARY OF SAMPLING PROGRAM

Location	*Matrix*	*Locations to be Sampled*	*Frequency*	*Analysis*
Post-Excavation Soil Sampling	Soil	AOC 4 (4 sidewalls & 1 bottom) [1,2] AOC-4J(4 sidewalls & 1 bottom) [1,2] SR-01 (4 sidewalls & 1 bottom) [1,2] SWCB-01 (1 dry well bottom) [2] SWCB-02 (1 dry well bottom) [2] SWCB-03 (1 dry well bottom) [2] SE Dry Well (1 dry well bottom) [2] NE Dry Well (1 dry well bottom) [2]	Once [2]	Polycyclic Aromatic Hydrocarbons (PAHs) by SW-846 Method 8270D
Monitoring Wells	Aqueous	MW-01 MW-02 MW-03 MW-04 MW-05 MW-06S MW-06D	Quarterly	Volatile Organic Compounds (VOCs) by SW-846 Method 8260C PAHs by SW-846 Method 8270D by Selective Ion Monitoring (SIM)

Notes:

1. See Figure 4-1 in the Remedial Action Work Plan for tentative locations.
2. Additional sampling may be required if clean up goals are not met.

TABLE 4
SAMPLE TOTAL SUMMARY

Analytical Parameters	*Matrix*	*Number of Samples*	*Blind Field Duplicates [1]*	*MS/MSD Pairs [2]*	*Field Blanks [3]*	*Trip Blanks [4]*
Polycyclic Aromatic Hydrocarbons (PAHs)	Soil	20[5]	1	1	5	0
	Aqueous[6]	7	1	1	1	0
Volatile Organic Compounds (VOCs)	Aqueous[6]	7	1	1	1	1

Notes:

1. Duplicates are generally collected at a minimum frequency of five percent (1 per 20 field samples). More frequent collection may be warranted based on field conditions/observations and/or at the discretion of the Field Team Leader.
2. MS/MSD Pairs (two samples) will be collected at a minimum frequency of five percent (1 per 20 field samples). More frequent collection may be warranted based on field conditions/observations and/or at the discretion of the Field Team Leader.
3. Field Blanks will be collected at a minimum frequency of one per day. More frequent collection may be warranted based on field conditions/observations and/or at the discretion of the Field Team Leader.
4. Trip Blanks will be collected at the rate of one per sample shipment when VOCs are collected.
5. Final value to be determined based on the size of each excavation.
6. Number of aqueous samples is shown for each groundwater sampling event.

TABLE 5
DETAILED SUMMARY OF SOIL SAMPLING PROGRAM
SAMPLE TOTALS, ANALYTICAL METHODS, PRESERVATIVES, HOLDING TIMES AND CONTAINERS

Analytical Parameters	*Number of Samples* [1]	*Analytical Method Reference*	*Sample Preservation*	*Holding Time* [2]	*Container* [3]
PAHs	20+8 (1+5+1+1+0)	SW-846 Method 8270D	Cool, 4°C	5 days / 40 days	1 – 8 oz glass

Notes:

1. Total analytical samples + QA/QC samples (Blind Field Duplicate (5%), Field Blank one per day, Matrix Spike (5%), Matrix Spike Duplicate (5%), Trip Blank (VOCs only)).
2. Holding times are in accordance with Exhibit I of the June 2005 ASP. VOC holding times are days from the Validated Time of Sample Receipt (VTSR) until analysis. PAH holding times are days from VTSR until extraction / days from extraction to analysis.
3. As specified by Accutest Laboratories, Dayton, New Jersey.

TABLE 6
DETAILED SUMMARY OF AQUEOUS SAMPLING PROGRAM
SAMPLE TOTALS, ANALYTICAL METHODS, PRESERVATIVES, HOLDING TIMES AND CONTAINERS

Analytical Parameters	*Number of Samples* [1]	*Analytical Method Reference*	*Sample Preservation*	*Holding Time* [2]	*Container* [3]
PAHs	7+4 (1+1+1+1+0)	SW-846 Method 8270D [4]	Cool, 4°C	5 days / 40 days	2 – 1 L amber glass
VOCs	7+5 (1+1+1+1+1)	SW-846 Method 8260C	Cool 4°C, pH<2 (HCl)	10 days	3 – 40 ml glass Teflon-lined cap

Notes:

1. Total analytical samples + QA/QC samples (Blind Field Duplicate (5%), Field Blank one per day, Matrix Spike (5%), Matrix Spike Duplicate (5%), Trip Blank one per VOC shipment cooler). Total number of samples is for each sampling event.
2. Holding times are in accordance with Exhibit I of the June 2005 ASP. VOC holding times are days from the VTSR until analysis. PAH holding times are days from VTSR until extraction / days from extraction to analysis.
3. As specified by Accutest Laboratories, Dayton, New Jersey.
4. by SIM Analysis.

TABLE 7
VOLATILE ORGANIC COMPOUNDS (VOCs) COMPOUND LIST, REPORTING LEVELS, AND METHOD DETECTION LIMITS - AQUEOUS

Compound List	*CAS Number* [1]	*Reporting Levels Water (µg/L)*	*Method Detection Limit (µg/L)* [2, 3]
Acetone	67-64-1	10	3.3
Benzene	71-43-2	0.5	0.24
Bromochloromethane	74-97-5	1	0.37
Bromodichloromethane	75-27-4	1	0.23
Bromoform	75-25-2	1	0.23
Bromomethane	74-83-9	2	0.42
2-Butanone (MEK)	78-93-3	10	5.6
Carbon disulfide	75-15-0	2	0.25
Carbon tetrachloride	56-23-5	1	0.22
Chlorobenzene	108-90-7	1	0.19
Chloroethane	75-00-3	1	0.34
Chloroform	67-66-3	1	0.19
Chloromethane	74-87-3	1	0.41
Cyclohexane	110-82-7	5	0.28
1,2-Dibromo-3-chloropropane	96-12-8	2	0.99
Dibromochloromethane	124-48-1	1	0.15
1,2-Dibromoethane	106-93-4	1	0.23
1,2-Dichlorobenzene	95-50-1	1	0.19
1,3-Dichlorobenzene	541-73-1	1	0.23
1,4-Dichlorobenzene	106-46-7	1	0.27
Dichlorodifluoromethane	75-71-8	2	0.9
1,1-Dichloroethane	75-34-3	1	0.17
1,2-Dichloroethane	107-06-2	1	0.18
1,1-Dichloroethene	75-35-4	1	0.51
cis-1,2-Dichloroethene	156-59-2	1	0.27
trans-1,2-Dichloroethene	156-60-5	1	0.65
1,2-Dichloropropane	78-87-5	1	0.39
cis-1,3-Dichloropropene	10061-01-5	1	0.21
trans-1,3-Dichloropropene	10061-02-6	1	0.19
1,4-Dioxane	123-91-1	130	41
Ethylbenzene	100-41-4	1	0.27
Freon 113	76-13-1	5	0.52
2-Hexanone	591-78-6	5	1.7
Isopropylbenzene	98-82-8	1	0.23
Methyl Acetate	79-20-9	5	1.9
Methylcyclohexane	108-87-2	5	0.22
Methyl Tert Butyl Ether	1634-04-4	1	0.24
4-Methyl-2-pentanone(MIBK)	108-10-1	5	1
Methylene chloride	75-09-2	2	0.73

TABLE 7 (continued)
VOLATILE ORGANIC COMPOUNDS (VOCs) COMPOUND LIST, REPORTING LEVELS, AND METHOD DETECTION LIMITS - AQUEOUS

Compound List	*CAS Number* [1]	*Reporting Levels Water (µg/L)*	*Method Detection Limit (µg/L)* [2, 3]
Styrene	100-42-5	1	0.27
1,1,2,2-Tetrachloroethane	79-34-5	1	0.21
Tetrachloroethene	127-18-4	1	0.4
Toluene	108-88-3	1	0.16
1,2,3-Trichlorobenzene	87-61-6	1	0.23
1,2,4-Trichlorobenzene	120-82-1	1	0.21
1,1,1-Trichloroethane	71-55-6	1	0.25
1,1,2-Trichloroethane	79-00-5	1	0.21
Trichloroethene	79-01-6	1	0.22
Trichlorofluoromethane	75-69-4	2	0.43
Vinyl chloride	75-01-4	1	0.15
m,p-Xylene	179601-23-1	1	0.38
o-Xylene	95-47-6	1	0.17
Xylene (total)	1330-20-7	1	0.17

Notes:
1. Chemical Abstracts Service (CAS) Registry Number.
2. MDLs as per Accutest Laboratories, Dayton, New Jersey (08/2015).
3. Subject to change throughout the course of the project if the laboratory is required to update the MDLs. New MDLs must be approved by NYSDEC before being implemented.

TABLE 8
POLYCYCLIC AROMATIC HYDROCARBON (PAH) COMPOUND LIST,
REPORTING LEVELS, AND METHOD DETECTION LIMIT LIMITS - SOIL AND AQUEOUS

Compound List	*CAS Number* [1]	*Reporting Levels Soil (µg/kg)* [2]	*Method Detection Limit (µg/kg)* [2, 3, 4]	*Reporting Levels Soil (µg/l)* [3]	*Method Detection Limit (µg/l)* [3, 4]
Acenaphthene	83-32-9	33	6.7	0.1	0.013
Acenaphthylene	208-96-8	33	5	0.1	0.012
Anthracene	120-12-7	33	7.5	0.1	0.013
Benzo(a)anthracene	56-55-3	33	6.4	0.05	0.019
Benzo(a)pyrene	50-32-8	33	8	0.05	0.03
Benzo(b)fluoranthene	205-99-2	33	6.6	0.1	0.021
Benzo(g,h,i)perylene	191-24-2	33	11	0.1	0.026
Benzo(k)fluoranthene	207-08-9	33	11	0.1	0.019
Chrysene	218-01-9	33	8.2	0.1	0.015
Dibenzo(a,h)anthracene	53-70-3	33	8	0.1	0.035
Fluoranthene	206-44-0	33	12	0.1	0.011
Fluorene	86-73-7	33	25	0.1	0.027
Indeno(1,2,3-cd)pyrene	193-39-5	33	11	0.1	0.031
Naphthalene	91-20-3	33	4.9	0.1	0.013
Phenanthrene	85-01-8	33	7.1	0.1	0.016
Pyrene	129-00-0	33	7.5	0.1	0.013

Notes:

1. Chemical Abstracts Service (CAS) Registry Number.
2. Reporting Levels and Method Detection Limits (MDLs) will vary depending on percent moisture.
3. MDLs as per Accutest Laboratories, Dayton, New Jersey (08/2015 for soil and aqueous).
4. Subject to change throughout the course of the project if the laboratory is required to update the MDLs. New MDLs must be approved by NYSDEC before being implemented.

TABLE 9
ANALYTICAL LABORATORY DATA QUALITY OBJECTIVES (DQOs)
FOR PRECISION AND ACCURACY – VOCs

QC Compounds	*Surrogate Accuracy (% Rec.)* [1]	*Blind Field Duplicate Precision (RPD)*	*Method Blanks*	*MS/MSD Accuracy (% Rec.)* [1]	*MS/MSD Precision (% RPD)* [1]	*Blank Spike Accuracy (% Rec.)* [1]
all compounds		< 50	≤ 5 x RL			
Acetone			for	33-158	19	47-144
Benzene			methylene	43-138	12	81-119
Bromochloromethane			chloride,	75-127	12	84-120
Bromodichloromethane			acetone,	72-128	13	81-125
Bromoform			2-butanone,	70-131	12	74-128
Bromomethane				47-142	16	52-146
2-Butanone (MEK)			≤ RL	56-146	12	68-130
Carbon disulfide			for	38-136	17	71-129
Carbon tetrachloride			other	45-149	17	77-140
Chlorobenzene			compounds	70-124	12	84-116
Chloroethane				47-139	15	70-148
Chloroform				66-126	13	81-120
Chloromethane				41-140	15	50-143
Cyclohexane				30-148	17	77-125
1,2-Dibromo-3-chloropropane				64-136	14	66-132
Dibromochloromethane				75-126	12	81-122
1,2-Dibromoethane				77-124	11	81-120
1,2-Dichlorobenzene				71-124	12	80-117
1,3-Dichlorobenzene				69-125	12	81-116
1,4-Dichlorobenzene				69-122	12	80-115
Dichlorodifluoromethane				24-161	20	36-169
1,1-Dichloroethane				60-129	13	80-125
1,2-Dichloroethane				72-133	12	78-131
1,1-Dichloroethene				40-137	17	73-127
cis-1,2-Dichloroethene				57-128	13	77-118
trans-1,2-Dichloroethene				53-128	15	75-118
1,2-Dichloropropane				69-127	12	80-124
cis-1,3-Dichloropropene				67-129	14	72-121
trans-1,3-Dichloropropene				68-130	14	73-122
1,4-Dioxane				56-146	21	63-145
Ethylbenzene				38-139	12	80-118
Freon 113				34-154	18	76-140
2-Hexanone				55-148	15	66-128
Isopropylbenzene				54-137	15	78-125
Methyl Acetate				60-137	13	63-120
Methylcyclohexane				30-152	17	69-132

TABLE 9 (continued)
ANALYTICAL LABORATORY DATA QUALITY OBJECTIVES (DQOs)
FOR PRECISION AND ACCURACY - VOCs

QC Compounds	*Surrogate Accuracy (% Rec.)* [1]	*Blind Field Duplicate Precision (RPD)*	*Method Blanks*	*MS/MSD Accuracy (% Rec.)* [1]	*MS/MSD Precision (% RPD)* [1]	*Blank Spike Accuracy (% Rec.)* [1]
Methyl Tert Butyl Ether				64-132	13	73-122
4-Methyl-2-pentanone(MIBK)				68-139	12	73-129
Methylene chloride				63-128	13	75-122
Styrene				61-134	13	81-121
1,1,2,2-Tetrachloroethane				67-126	13	69-116
Tetrachloroethene				43-145	15	69-138
Toluene				51-136	13	80-122
1,2,3-Trichlorobenzene				66-140	14	74-137
1,2,4-Trichlorobenzene				65-138	15	75-135
1,1,1-Trichloroethane				51-141	16	80-131
1,1,2-Trichloroethane				71-127	12	78-122
Trichloroethene				55-136	14	83-122
Trichlorofluoromethane				33-157	21	66-143
Vinyl chloride				34-147	17	57-138
m,p-Xylene				42-139	13	82-119
o-Xylene				56-134	13	82-119
Xylene (total)				46-137	12	82-119
Dibromofluoromethane	76-120					
1,2-Dichloroethane-d4	73-122					
Toluene-d8	84-119					
4-Bromofluorobenzene	78-117					

Notes:
1. In-house QC limits established by Accutest Labs, Dayton, New Jersey for USEPA Method SW-846 8260C. Subject to change.
QC = Quality Control; % Rec. = Percent Recovery; RPD = Relative Percent Difference; MS = Matrix Spike; MSD = Matrix Spike Duplicate; RL = Reporting Limit.

TABLE 10
ANALYTICAL LABORATORY DATA QUALITY OBJECTIVES (DQOs) FOR PRECISION AND ACCURACY - PAHs

QC Compounds	*Surrogate Accuracy (% Rec.)* [1]	*Blind Field Duplicate Precision (RPD)*	*Method Blanks*	*Soil MS/MSD Accuracy (% Rec.)* [1]	*Soil MS/MSD Precision (% RPD)* [1]	*Soil Blank Spike Accuracy (% Rec.)* [1]	*Aqueous MS/MSD Accuracy (% Rec.)* [1]	*Aqueous MS/MSD Precision (% RPD)* [1]	*Aqueous Blank Spike Accuracy (% Rec.)* [1]
all compounds		< 100	≤ RL						
Acenaphthene		for soil		32-140	36	58-123	51-116	20	45-125
Acenaphthylene				23-120	36	47-100	47-107	20	37-118
Anthracene		< 50		32-142	38	58-123	55-121	21	48-136
Benzo(a)anthracene		for aqueous		30-139	42	56-119	51-120	20	33-136
Benzo(a)pyrene				32-145	42	55-129	45-128	20	44-123
Benzo(b)fluoranthene				30-147	43	54-130	38-137	28	32-146
Benzo(g,h,i)perylene				27-148	41	49-130	34-138	23	47-129
Benzo(k)fluoranthene				32-138	41	53-124	34-136	30	34-154
Chrysene				31-144	42	58-125	50-123	21	43-143
Dibenzo(a,h)anthracene				35-141	39	52-128	35-142	25	43-144
Fluoranthene				27-146	42	58-125	51-126	20	46-122
Fluorene				37-138	39	58-124	53-122	22	49-125
Indeno(1,2,3-cd)pyrene				28-151	41	50-129	36-140	25	45-142
Naphthalene				29-125	38	48-116	36-119	21	36-128
Phenanthrene				28-142	42	55-120	49-126	20	41-129
Pyrene				27-150	42	55-123	52-122	22	47-130
Nitrobenzene-d5	33-127 (soil); 23-131 (aqueous)								
2-Fluorobiphenyl	41-121 (soil); 24-120 (aqueous)								
Terphenyl-d14	44-137 (soil); 10-125 (aqueous)								

Notes:
1. In-house QC limits established by Accutest Labs, Dayton, New Jersey for USEPA Method SW-846 8270D. Subject to change.

QC = Quality Control; % Rec. = Percent Recovery; RPD = Relative Percent Difference; MS = Matrix Spike; MSD = Matrix Spike Duplicate; RL = Reporting Limit

APPENDIX G

Health and Safety Plan

Site Specific
Health and Safety Plan

J&H Manufacturing
Carle Place, New York

October 2013

Prepared by:

ENVIRONMENTAL RESOURCES MANAGEMENT
105 Maxess Road, Suite 316
Melville, New York 11747

TABLE OF CONTENTS

ATTACHMENTS

SAFE WORK PRACTICES & JOB HAZARD ANALYSES (INCLUDED AS ATTACHMENT 1)

A.0 SITE SPECIFIC HEALTH AND SAFETY PLAN (HASP)

A.1 INTRODUCTION

This Health and Safety Plan (HASP) has been developed by ERM for the Implementation of the Site Wide Remedial Action Work Plan (RAWP) of the J&H Manufacturing Site in Carle Place, NY. The procedures set forth in this HASP are designed to reduce the risk of exposure to chemical substances and physical or other hazards that may be present. The procedures described herein were developed in accordance with OSHA 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response, U.S. Dept. of Labor, OSHA.

The recommended health and safety guidelines within this HASP will be modified if future information changes the activities to be performed or the characterization of the area in which work is to be performed.

A.1.1 Health and Safety Policy Statement

ERM developed the following Health and Safety Plan (HASP) for use by ERM personnel and by ERM contractors (individually, an "ERM Contractor" and collectively, "ERM Contractors"). ERM personnel must adhere to the practices and procedures specified in the HASP. Each ERM Contractor must review the HASP and agree to accept and abide by the HASP, subject to any modifications to the HASP (to address the ERM Contractor's more stringent practices and procedures) agreed upon in writing by ERM and the ERM Contractor. The ERM Contractor shall indicate such acceptance by signing this document prior to commencing work at the Site. However, if any ERM Contractor commences work at the Site, the ERM Contractor shall be deemed to have accepted the HASP and the terms hereof and the failure to execute and return to ERM a copy of this notice shall not be relevant to such interpretation.

If a contractor or a person other than the Client, ERM employees and ERM Contractors (individually, a "Third Party" and collectively, "Third Parties") receives a copy of the HASP, such Third Party should not assume that the HASP is appropriate for the activities being conducted by the Third Party.

NO THIRD PARTY HAS THE RIGHT TO RELY ON THE HASP. EACH THIRD PARTY SHOULD ABIDE BY ITS OWN SITE-SPECIFIC HEALTH AND SAFETY PLAN IN ACCORDANCE WITH ITS OWN PROFESSIONAL JUDGMENT AND ESTABLISHED PRACTICES.

ERM shall not be responsible for the implementation of any Third Party safety program(s), except to the extent otherwise expressly agreed upon

by ERM and a Third Party in writing. The services performed by ERM for the Client and any right of the client and/or an ERM Contractor to rely on the HASP shall in no way inure to the benefit of any Third Party, including, but not limited to, employees, agents, or consultants and subcontractors of ERM Contractors, so as to give rise to any cause of action by such Third Party against ERM.

The HASP generated by ERM in connection with the Project is for use on a specific site and in connection with a specific project. ERM makes no representation or warranty as to the suitability of the HASP for reuse on another site or as to the suitability of the HASP for reuse on another project or for modifications made by the Client or a Third Party to the HASP.

All entrants to portions of the jobsite controlled by ERM must sign the HASP. Signing below certifies understanding and willingness to comply with the contents of this HASP. ERM has prepared this plan solely for the purpose of protecting the health and safety of ERM employees. Subcontractors, visitors, and others at the site are required to follow provisions in this document at a minimum, but must refer to their organization's health and safety program for their protection.

Printed Name	Signature	Company	Date

A.2 ERM PROJECT PERSONNEL AND RESPONSIBILITIES

ERM Project Director (PD) Michael Teetsel
Overall project responsibility; conducts ultimate Quality Assurance/Quality Control (QA/QC) review.

ERM Project Manager (PM): John Mohlin, P.E.
Manages day-to-day activities; reports to PD.

ERM Project Health and Safety Coordinator: Matt Boardman
Directs development of HASP; provides technical advice on health and safety issues.

ERM Site Safety Officer (SSO): Brice Lynch
Responsible for implementation of HASP; reports to PD. The SSO (or his substitute) will meet all applicable ERM training requirements.

A.3 FIELD ACTIVITIES

The objective of the Site Wide RAWP is to remove subsurface soil contamination from four AOCs, AOC 1, AOC 4, AOC 5, & AOC 9 and continue operating the existing sub-slab depressurization system currently on site. See ERM Remedial Action Work Plan, October 2013, for the full scope of work. A summary of these activities are provided below:

- Remedial Mobilization
- Excavation of Contaminated soils
- Vacuum removal of soil from dry wells
- Off-site soil transportation and disposal
- Confirmation Soil Sampling
- Health & Safety and air monitoring
- Operation of sub-slab depressurization system
- Groundwater sampling
- Site restoration

A.4 HAZARD IDENTIFICATION and CONTROL

A.4.1 Hazard Identification Process

Prior to initiating any new project activity or when there is a change in site conditions, the Site Safety Officer (SSO) will assist project team members in completing a Job Hazard Analysis (JHA). A copy of the JHA form is located in Attachment 1, as well as JSAs applicable to this work. The selected subcontractor will be required to provide similar JSAs for its work tasks.

A.4.2 Chemical Hazards

Chemicals may be introduced into the body by ingestion, inhalation, or absorption through the skin. Since not all chemicals have the same level of toxicity, the length of time for the exposure and the concentration of the chemical are important in determining the risk. Inhalation and skin contact are the most common routes of entry. Chemicals can be introduced into the body by ingestion when chemicals present on the hands are transferred to food or cigarettes.

Based on historical soil and groundwater sampling, the chemicals of concern that may be encountered at the site are listed as follows:

- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Chrysene
- Dibenzo(a,h)anthracene
- Indeno(1,2,3-cd)
- PCE
- TCE
- cis-1,2-DCE

The pertinent health and safety information regarding these substances is provided in Tables A-1 and A-2. Note that among the metals that have been detected in Site soil, lead was detected at the highest concentrations and is therefore assumed to represent the worst-case risk for metals exposure. Safety data for other substances that may be used on the project are proved in Table A-3.

A.4.3 Ambient Air Monitoring

Ambient air monitoring will be conducted in the work zone by ERM during all intrusive field activities under the supervision of the SSO. This monitoring will be conducted using direct-reading real-time instruments as indicated in Table A-4. This table also provides action levels for upgrading the level of personal protective equipment (PPE) from Level D to Level C. Alternatively, work in Level D PPE may be stopped and alternate controls may be instituted, if appropriate. A summary of the action levels is provided below:

- Volatile Organic Compounds (VOCs) – Action level shall be 5.0 ppmv as measured by a Photovac photoionization detector (PID) with an 11.6 eV bulb or a flame ionization detector (FID). Monitoring for VOCs will only be conducted in areas where VOCs have been detected. At this time, no remedial excavation work is planned in any areas with known VOCs.
- Respirable Dust – Action level shall be 5.0 mg/m^3 as measured by a MIE DR 1000 Personal Data RAM Aerosol Monitor. This action level is also adequately protective with respect to non-volatile chemicals (PAHs and metals) that may be present in site soil (see Table A-2).

Direct reading instrumentation will be calibrated daily per manufacturer's instructions. Cylinders of the appropriate calibration gas will be required for fieldwork lasting longer than one day.

Additional air monitoring will be conducted on the work zone perimeter (upwind and downwind) as per the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan (CAMP). The NYSDOH CAMP is provided as Attachment 3. Additional monitoring might also be conducted under any of the following circumstances.

- Work begins on a new portion of the site.
- Change in job tasks.
- Change in weather.
- Change in ambient levels of hazardous constituents as indicated by the sense of smell or changes in the physical appearance of the soil or groundwater.
- When new hazardous substances are encountered.

A.4.4 Site-Specific and Task-Specific Hazards and Control Strategies

The hazards and control strategies associated with planned work activities

are summarized in Table A-5. During the mobilization phase of a specific work task, the project team can quickly review the hazards and control strategies by locating the task or activity to be performed on the table. Hazards that are common to all activities performed at the site are listed first. The hazards listed for a particular task or activity includes the common hazards.

Some construction activities may be conducted within the Site building. This work will be curtained off from the remainder of the indoor space and vented to the exterior if necessary. Ambient air monitoring will be conducted both inside and outside the curtain as described above in Section A.4.3. Should exceedances of the listed action levels be detected outside the curtain, work at that location will be temporarily halted until appropriate controls are put in place so that the job can be completed safely, without unacceptable exposures to plant workers.

A.5 PERSONAL PROTECTIVE EQUIPMENT

The level of PPE selected for a task is based on the following:

- Type and measured concentration of the chemical substance in the ambient atmosphere and its toxicity.
- Potential for exposure to substances in air, splashes of liquids or other direct contact with material due to work being done.
- Knowledge of chemicals on-site along with properties such as toxicity, route of exposure, and contaminant matrix.

In situations where the type of chemical, concentration, and possibilities of contact are not known, the appropriate level of protection must be selected based on professional experience and judgment until the hazards can be better identified.

In addition to summarizing the general PPE requirements for tasks performed at the site, Table A-6 also serves as the written certification that the PPE Hazard Assessment has been conducted.

A.5.1 Respiratory Protection

The type of respiratory protection required will be based on the results of ambient air monitoring described above in Section A.4.3 and the professional judgment of the SSO and the Project Health and Safety Coordinator.

As required by 29 CFR 1910.134, *Respiratory Protection*, a cartridge change-

out schedule will be developed if it is necessary to upgrade to Level C based on either the results of ambient air monitoring, the results of any models used to predict ambient air concentration; or the professional judgment of the Project Health and Safety Coordinator. At a minimum, new respirator cartridges must be placed on the respirator at the beginning of the shift and after lunch, and this will be documented in the daily logs.

A.6 HEAT AND COLD STRESS

A.6.1 Heat Stress

The timing of these activities may be such that heat stress may pose a threat to the health and safety of Site personnel. Acclimation periods and work/rest regimens will be implemented as necessary so that personnel do not suffer adverse effects from heat stress. Heat stress, if necessary, will be monitored in accordance with the American Conference of Governmental and Industrial Hygienists (ACGIH) Threshold Limit Values (TLV) for Heat Stress or equivalent when the temperature is greater than 80°F. The following work/rest regimen will be utilized:

Temp °F	*Work-Rest Regimen*
80	Work Break Every 2 hours.
82	75% Work – 25% Rest, each hour.
85	50% Work – 50% Rest, each hour.
88	25% Work – 75% Rest, each hour.
90	Delay work until cooler temperatures prevail.

Special clothing and an appropriate diet and fluid intake will be recommended for all Site personnel to further reduce these temperature-related hazards. A good rule of thumb to prevent dehydration from heat stress is that fluid intake should equal fluid loss from the body, which can be accomplished through frequent small intakes of water. Potable water and/or a drink substitute (i.e., Gatorade) will be available for employee consumption.

A.6.2 Cold Stress

The timing of investigative or remediation activities may be such that cold stress may also present a threat to the health and safety of Site employees. Work/rest schedules, with rest in a warming shelter, will be implemented as necessary to reduce adverse effects from cold exposure. Cold stress, if necessary, will be monitored in accordance with the ACGIH TLV for Cold

Stress or equivalent. The addition of wind speed and the resulting wind chill will be considered when determining an appropriate work/rest schedule and appropriate clothing.

Site personnel will be encouraged to consume water to avoid dehydration. Potable water and/or a drink substitute (i.e., Gatorade) shall be available for employee consumption. Workers will wear adequately insulated clothing to limit exposure to cold.

A.7 SAFE WORK PRACTICES AND STANDARD OPERATING PROCEDURES

A.7.1 General Site Provisions

A.7.1.1 Smoking and Eating Areas

Smoking will only be allowed in designated areas. Upon mobilization at the site, the SSO will establish smoking areas per site-specific or client-specific requirements. Individuals caught smoking outside the designated smoking areas will be subject to disciplinary action up to and including immediate termination.

Upon mobilization at the site, the SSO will establish eating and break areas per site-specific or client-specific requirements. Eating will only be allowed in the designated areas and the areas will be maintained in a clean and sanitary condition.

A.7.1.2 Temporary Facilities

This project will not require any temporary facilities.

A.7.1.3 Standard Operating Procedures

The following standard operating procedures will be adhered to at all times.

- All personnel entering the site must check in with the SSO.
- All individuals entering the site must demonstrate to the SSO that they have been adequately trained as defined in Section 10.
- All individuals must be familiar with emergency communication methods and how to summon emergency assistance.
- Use of alcoholic beverages before, during operations, or immediately after hours is absolutely forbidden. Alcohol can reduce the ability to detoxify compounds absorbed into the body as the result of minor

exposures and may have negative effects with exposure to other chemicals. In addition, alcoholic beverages will dehydrate the body and intensify the effects of heat stress.

- Horseplay of any type is forbidden.
- All unsafe conditions will be immediately reported to the SSO, who will document such conditions in the field log. The SSO will be responsible for ensuring that the unsafe condition is correctly as quickly as possible.
- Smoking, matches, and lighters are only allowed in the designated smoking area.
- Avoid contact with potentially contaminated substances. Avoid, whenever possible, kneeling on the ground, or leaning or sitting on trucks, equipment or the ground. Do not place equipment on potentially contaminated surfaces.

A.7.2 Safe Work Practices

A.7.2.1 Ergonomics

Ergonomic risk factors include repetitive motion, force, awkward posture, and vibration. The key to preventing ergonomic injuries is education of personnel relative to the hazards and risk factors and implementation of proper controls and work practices.

Several tasks associated with this project have the potential to cause back injuries, if proper lifting techniques are not followed. Site workers should not lift objects that are beyond their physical capabilities and the use of mechanical devices such as forklifts is encouraged. In addition, when shoveling, site workers should not twist their backs while moving materials with the shovel. The proper technique is to move the feet.

Proper lifting techniques are summarized below.

- Place feet shoulder width apart with toes pointing slightly out.
- Bend at your knees keeping back straight.
- Get a good grip on the object and pull object close to your body.
- Tighten abdominal muscles.
- Keep your head up, looking forward, and lift with your legs while maintaining a straight back.
- Keep load close to your body and ensure your view is not obstructed.

- If one end of the load is heavier than the other, the heavier end should be closest to your body.
- Move your feet to relocate the object as opposed to twisting your back.
- When placing the object down, bend your knees and use your leg muscles while keeping your back straight.

A.7.2.2 Pre-Drilling/Pre-Excavation and Probing Protocol

Prior to mobilizing to the field, the Project Manager will be responsible for ensuring the following issues have been adequately addressed:

- Contacting One-Call or equivalent to identify underground pipelines, utility lines, and fiber optic cable.
- Contacting appropriate municipality to identify underground and sewer lines.
- Contacting posted pipeline companies.
- Request that the Site Operator markout existing subsurface utilities in the work areas.
- If necessary, engage a subcontractor to perform further markouts, as necessary to ensure safe work conditions.
- Complete Subsurface Clearance Location Disturbance Permit (Attachment 2)
- Complete a Subsurface Clearance Location Disturbance Permit and submit to the Partner-in-Charge (PIC) for approval (Attachment 2)
- Complete Excavation Safety Checklist

A.7.2.3 Fall Protection

This project does not involve working from heights more than six feet above grade.

A.7.2.4 Weather Related Events

Weather related events that may impact fieldwork include, but are not limited to, rain, snow, thunder, and lightning. The SSO will be responsible for determining what site work can be performed safely in the rain and at what point work will cease due to either quality or safety issues. In the event of thunder and/or lightning, all work will be suspended until 15 minutes have elapsed from the last clap of thunder or flash of lightning.

During rain, lightning and/or thunder events, site workers should seek shelter in either a building or vehicle.

A.7.2.5 Night Work

Adequate lighting shall be installed for any activities being performed at night. All time-of-day specific noise limits will be maintained at property boundaries.

A.7.2.6 Noise

Employees performing any noisy task, such as but not limited to, operating heavy equipment, drilling, using power tools, or employees working within 20 feet of the person performing the task will wear hearing protection consisting of either earplugs or earmuffs. Personnel operating a drilling rig or standing within 20 feet of a drilling rig during operation will also wear hearing protection.

A.8 EMPLOYEE TRAINING

All employees and subcontractors working on-site, who may be exposed to hazardous substances, health hazards, or safety hazards and their supervisors and management responsible for the site will receive training meeting the requirements of 29 CFR 1910.120, *Hazardous Waste Operations and Emergency Response* (HAZWOPER) before they are permitted to engage in any job task. Employees will not be permitted to participate in or supervise field activities until they have been trained to a level required by their job function and responsibility. Once on-site, all site workers will receive training covering at a minimum the following.

- Names of personnel and alternates responsible for site safety and health;
- Safety, health and other hazards present on the site;
- Use of PPE;
- Safe use of engineering controls and equipment on the site; and
- Medical surveillance requirements including recognition of symptoms and signs that might indicate overexposure to hazards.

A.8.1 Subcontractor Training

The SSO will verify that subcontractor personnel have received all

appropriate training as required by this HASP prior to their arriving on-site. Verification will consist of reviewing written training documentation such as copies of training certificates or cards. Copies of the written training documentation will be retained in the project file. Subcontractor personnel will not be allowed to work at the site unless said training documentation is available. All subcontractors will be approved in ERM's subcontractor prequalification database – PICS Auditing.

A.8.2 Medical Surveillance

All ERM employees are enrolled in a medical surveillance program. All employees receive an initial medical examination and consultation prior to assignment to any job site. In addition, employees receive an annual or biennial medical examination, a medical examination upon termination of employment, and a medical examination when the employee exhibits signs or symptoms relating to possible overexposure to hazardous substances or when an injury or exposure above published exposure limits has occurred in an emergency situation.

Additional medical surveillance should be provided for employees who:

- Are or may be exposed to hazardous substances or health hazards at or above published exposure levels for these substances for 30 days or more a year;
- Wear a respirator for 30 days or more a year or as required by 29 CFR 1910.134, *Respiratory Protection*; and
- Are injured, become ill or develop signs or symptoms due to possible overexposure involving hazardous substances or health hazards from an emergency response or hazardous waste operation.

A.8.3 Daily Tailgate Safety Meeting

A tailgate safety meeting will be conducted each morning. The daily safety meeting meetings will include awareness concerns such as special concerns regarding health and safety, pollution prevention or a discussion of recent incidents or safety observations. Issues such as any changes to the HASP will be addressed daily. The meetings will include a discussion of what tasks will be completed that day and how those tasks will be conducted safely. The meetings will be documented on the Daily Safety Meeting form found in Attachment 4.

A.9 SITE CONTROL MEASURES

The drilling location and surrounding area will be considered the work zone. Drilling will take place in different areas and new work zones will be delineated by the SSO as the drill rig is moved and during monitoring well sampling. The work area will be delineated using traffic cones and/or "Caution" tape. The SSO will ensure that no one enters the work zone without the proper training and requirements. All personnel entering the Work Zone will sign the project sign-in sheet in Attachment 5. Furthermore, all ERM personnel and subcontractor will sign-in at the start of each workday and sign out at the end of each workday.

A.10 DECONTAMINATION PROCEDURES

Decontamination involves the orderly controlled removal of contaminants from both personnel and equipment. The purpose of decontamination procedures is to prevent the spreading of contaminated materials into uncontaminated areas. All site personnel should limit contact with contaminated soil, groundwater or equipment in order to reduce the need for extensive decontamination.

A.10.1 Personnel Decontamination

The following decontamination procedures will be utilized:

- Clean rubber boots with water.
- Remove all PPE and dispose of the PPE in the designated drums.
- Wash hands and any skin that may have come in contact with affected soil or groundwater with moistened disposable towels, such as baby wipes, or soap and water.

A.10.2 Equipment Decontamination

All drilling equipment and the back of the drilling rig shall be decontaminated by steam cleaning prior to performance of the first boring/well installation and between all subsequent borings/well installations. This shall include all hand tools, casing, augers, drill rods and bits, tremie pipe and other related tools and equipment. The steam cleaning equipment shall be capable of generating live steam with a minimum temperature of 212^{o} degrees Fahrenheit. The equipment shall be cleaned to the satisfaction of the ERM's hydrogeologist.

A.11 CONFINED SPACE ENTRY PROCEDURES

Entry into permit-required confined spaces is not anticipated or

permitted.

A.12 SPILL CONTAINMENT PROGRAM

The project activities involve the use of drums or other containers, the drums or containers will meet the appropriate DOT regulations and will be inspected and their integrity assured prior to being moved. Operations will be organized so as to minimize drum or container movement. Drums or containers that cannot be moved without failure will be over packed into an appropriate container.

A.12.1 Hydraulic Fluid/Engine Oil/Fuel Spills

In the event of an unexpected release of hydraulic fluid, engine oil, gasoline or diesel fuel, the release material will be absorbed with sorbent pads, which will be placed in a designated drum for disposal. Impacted soil will be excavated and placed on plastic sheeting and covered until characterization and/or disposal can be arranged.

A.13 SITE COMMUNICATION

Cell phones will be used for communication between the project team and the client and office.

A.14 COMMUNICATION AND REVIEW OF SITE-SPECIFIC HEALTH AND SAFETY PLAN

An initial review of the site-specific HASP will be held either prior to mobilization or after mobilization but prior to commencing work at the site to communicate HASP details and answer questions to individuals working at the site. Daily tailgate safety meetings will be held each morning to review work practices for the day and to discuss safety issues. Any new hazard or safety information will be disseminated at the daily tailgate safety meeting or as needed throughout the day.

A.15 EMERGENCY RESPONSE PLAN

This section describes possible contingencies and emergency procedures to be implemented at the site.

A.15.1 Personnel Roles and Lines of Authority

The SSO has primary responsibility for site evacuation and notification in the event of an emergency situation. This includes taking appropriate measures to ensure the safety of site personnel and the public. Possible

actions may involve the evacuation of personnel from the site area and ensuring that corrective measures have been implemented, appropriate authorities notified, and follow-up reports completed. If the SSO is not available, the ERM Project Geologist/Engineer will assume these responsibilities. Subcontractors will assist the SSO within the parameters of their scope of work.

A.15.2 Emergency Alarms

Because of the small work area and mobility of work areas, an emergency evacuation plan and meeting place will decide on the drilling or sampling locations.

A.15.3 Reporting Emergencies

All, including any late developing or aggravated injuries, must receive prompt medical attention. Immediately after the initial response to the incident is made (securing the scene, contacting emergency responders, or administering first aid), contact WorkCare at 1-888-449-7787 for medical advice.

The SSO is responsible for reporting all injuries, illnesses, fires, spills/releases, property damage or near misses. At the earliest time practicable following the occurrence of the emergency situation, the following individuals will be contacted:

- Injured/involved employee's supervisor;
- ERM Project Manager;
- ERM Partner-In-Charge;
- ERM Project Health and Safety Consultant; and
- Client Contact.

A.15.4 Emergency Contacts

In case of an emergency, the SSO will contact the following as appropriate.

TITLE/NAME	*PHONE NUMBERS*
ERM Project Director Michael B. Teetsel, C.P.G	Work: 802-767-9604 Mobile 860-324-6207
Project Manager John Mohlin, P.E.	Work: 631-756-8931 Mobile 516-315-6872
Site Safety Officer Brice Lynch	Work: 631-756-8931 Mobile 631-219-6819

TITLE/NAME	*PHONE NUMBERS*
Project Geologist/Engineer TBD	Work: 631-756-8900 Mobile: TBD
Project Health and Safety Coordinator Paulina Gravier	Work: 212-447-1900 Mobile: 917-664-2590
Mr. Girish Desai, P.E. NYSDEC	Work: 631-444-0243
Local Emergency Responders – all services	Phone: 911
Hospital: Winthrop University Hospital 259 1st Ave. Mineola, NY	Phone: 516-663-0333

A.15.5 Incident Investigations

Safety events are occurrences or conditions that may contribute to or result in an injury, occupational illness or property damage. ERM seeks to learn from the investigation of the following types of safety events:

- Unsafe acts and unsafe conditions,
- Near misses, and
- Incidents (injury, illness, property damage, fire, or chemical spill).

All safety events must be reported promptly. Immediate verbal notification to the project PM and PIC is required, as well as entry of the event into the Event Communication System (ECS), ERM's electronic safety event reporting system within 48 hours of the safety event occurring.

A.15.6 Directions to Nearest Hospital

The nearest hospital is *Winthrop University Hospital.* A map and directions to this facility are located in Attachment 6.

Winthrop University Hospital
259 1st Avenue – Mineola, NY
516-663-0333

A.15.7 Emergency Drills

In accordance with the HAZWOPER Standard emergency response plans will be rehearsed regularly as part of the overall training program for site operations. The frequency of this drill (rehearsal) is outlined below:

PROJECT DURATION	*DRILL FREQUENCY*
Less than 30 days	None, cover during review and sign-off of HASP
Greater than one month, less than one year	Once
Greater than one year	Annually

All drills will be documented in the field book. Drills do not need to be elaborate. A tabletop scenario during the daily safety meeting is an adequate drill.

A.16 SAFETY EQUIPMENT

A first aid kit containing first aid items for minor incidents only and a fire extinguisher is maintained in each ERM Northeast vehicle. If you are driving a personal vehicle or a rental vehicle, please rent a first aid kit and fire extinguisher from the equipment room.

Attachment 1

Safe Work Practices & Job Hazard Analyses

	SAFE WORK PRACTICE	
ERM	SOP #:	1
	Title:	Hazard Communication
	Last Rev.:	1/12/2011
	Page:	1 of 3

SCOPE

This procedure provides guidance on meeting regulatory requirements and ensuring that the information necessary for the safe use, handling and storage of hazardous chemicals is provided and made available to employees.

DEFINITIONS

- **Hazardous Chemical –** Any chemical which is a physical hazard or a health hazard.

- **Hazard Warning –** Any words, pictures, symbols, or combination thereof appearing on a label or other appropriate form of warning which convey the specific physical and health hazard(s), including target organ effects, of the chemical(s) in the container(s).

- **Health Hazard –** A chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals that are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents that act on the hematopoietic system, and agents which damage the lungs, skin, eyes, or mucous membranes.

- **Physical Hazard –** A chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive.

PROCEDURE

A. The Field Safety Officer will develop a chemical inventory of all known chemicals to be used or present as a potential contaminant at the job site.

B. The Field Safety Officer will ensure that all containers (drums, bottles, etc.) are labeled with the identity of the known hazardous chemical contained and any appropriate hazard warnings. Containers that are not labeled or where labels have faded or been removed will be relabeled immediately.

C. The Field Safety Officer will include NIOSH International Chemical Safety Data Cards for chemicals present as site constituents of concern and Material Safety Data Sheets (MSDSs) for chemicals brought to the site for the job. For assistance, contact a H&S team member.

D. The Field Safety Officer will ensure employees have been trained on site-specific HazCom, including:

1. Methods that may be used to detect a release of hazardous chemical(s) in the workplace;
2. Physical and health hazards associated with chemicals;
3. Protective measures to be taken;
4. Safe work practices, emergency responses and use of personal protective equipment (PPE); and
5. Information on the Hazard Communication Standard including:
   a. Labeling and warning systems, and
   b. An explanation of Material Safety Data Sheets.

E. The Field Safety Officer will identify PPE based on the task involved and the chemical properties.

F. The Field Safety Officer will inform employees of any non-routine tasks and the chemical hazards associated with the tasks. Review the safe work practices and use of required PPE prior to the start of such tasks.

G. The Field Safety Officer will provide information on hazardous chemicals known to be present to subcontractors and other employers on the site. Employers are responsible for providing necessary information to their employees. Ensure other onsite employers are provided with the applicable HazCom information.

H. All site personnel are required to report any incident of a chemical over-exposure or of a chemical spill to the Field Safety Officer. Follow the emergency response/spill response procedures described in the HASP.

REFERENCES

Regulatory References

- 29 CFR 1910.1200, Hazard Communication

Technical References

NIOSH Universal Chemical Safety Data Cards

Procedural References

- SWP 9, Personal Protective Equipment

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Integrated with ERM H&S program, removed references to RCM

	SAFE WORK PRACTICE	
ERM	SOP #:	2
	Title:	Medical Services / First Aid
	Last Rev.:	1/12/2011
	Page:	1 of 2

SCOPE

This procedure describes the requirements for providing medical services and first aid at the job site.

DEFINITIONS

None.

PROCEDURE

A. H&S team member will identify the mode by which medical services and first aid will be administered and document in the Health and Safety Plan (HASP). This will generally be recorded by identifying the nearest medical facility to the job site and providing a map with the location identified.

B. In the absence of reasonably accessible medical services (i.e., within 5 minutes by ambulance), the Field Safety Officer or a person certified in first aid will be available at the site to render first aid.

C. At jobsites where the eyes or body of any employee may be exposed to corrosive or otherwise hazardous chemicals, quick-drenching/eye washing facilities must be provided.

D. First aid supplies must be easily accessible at a job site, when required. The contents of the kit must be checked by the Site Safety Officer before being sent out on each job and weekly during the job, to ensure that items used are replaced.

E. Field first aid kits should contain the following items:

Band aids 3/4" x 3"
Non-stick pads, medium
Kling rolled bandage 2"
Triangular bandage 51"
Hypo-allergenic first aid cream
Adhesive Tape ½" x 5 yd
Scissors
Butterfly bandages
Antiseptic wipes
Burn cream, 8 oz.
Foil packs
Amoply, ammonia inhalants 0.33 ml.
Tylenol, extra strength
Oval eye pads
Examination gloves

REFERENCES

Regulatory References

- 29 CFR 1926.50, Medical Services and First Aid

Technical References

- ANSI Z308.1-1978, Minimum Requirements for Industrial Unit-Type First-aid Kits

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM

SCOPE

This procedure provides guidance on meeting regulatory requirements when airborne contaminants may be present at the job site. This procedure applies to all types of airborne contaminants which may cause adverse health effects. These contaminants may be in the form of dusts, mists, gases, vapors or fumes.

DEFINITIONS

None.

PROCEDURE

A. H&S team member will develop an Air Monitoring Plan (AMP) for chemical constituents identified at the job site. The AMP must include the types of samples to be collected, such as real-time measurements, personal breathing zone and area samples, as well as identify the contaminants which will be monitored for.

B. Additional regulatory requirements may be triggered if a potential site contaminant is covered by an Occupational Safety and Health Administration (OSHA) substance-specific standard. The following list of contaminants have such regulations:

Asbestos	Coke Oven Emissions
13 Carcinogens	1,2-Dibromo-3-Chloropropane
Vinyl Chloride	Acrylonitrile
Inorganic Arsenic	Ethylene Oxide
Lead	Formaldehyde
Hexavalent Chromium	Methylenedianiline
Cadmium	1,3-Butadiene
Benzene	Methylene Chloride

CHEMICAL-SPECIFIC INFORMATION

Several chemicals listed in the table above are commonly encountered during ERM work on project sites. Additional information for more commonly-encountered chemicals is provided below.

Benzene

Potential employee exposure to benzene most commonly occur at ERM from installation, development, and sampling of groundwater wells, or from performing remediation activities involving benzene-contaminated soil. The occupational exposure limit for benzene is 1 ppm as an 8-hour time weighted average, with a short term exposure limit of 5 ppm as a 15-minute average.

As part of the industrial hygiene program at ERM, periodic eight-hour air samples are collected while ERM employees are performing tasks involving benzene-contaminated or potentially-contaminated soil or groundwater. Results of historical industrial hygiene monitoring and photoionization detector monitoring indicate that ERM employee exposure is well below the PEL.

A written program to reduce employee exposures below the permissible exposure limit is not required based on the results of historical air monitoring. If future monitoring results indicate an exposure over the permissible limit, a written program to reduce employee exposures will be developed and implemented.

Inorganic Lead
ERM employees are potentially exposed to lead from remediation activities where inorganic lead-contaminated soil is present. Past industrial hygiene monitoring has shown the potential for employee exposure to inorganic lead at or able the permissible exposure limit. ERM has developed a Lead Exposure Control Program outlining steps to be taken to control these exposures. The program is located at http://minerva.erm.com/Support/HS/AmericasHS/HS%20Program%20Documents/18.0%20Lead%20Exposure%20Compliance.pdf

REFERENCES

Regulatory References

- 29 CFR 1910.1000, Air Contaminants
- 29 CFR 1910.1001, Asbestos
- 29 CFR 1910.1003, 13 Carcinogens
- 29 CFR 1910.1017, Vinyl Chloride
- 29 CFR 1910.1018, Inorganic Arsenic
- 29 CFR 1910.1025, Lead
- 29 CFR 1910.1026, Hexavalent Chromium
- 29 CFR 1910.1027, Cadmium
- 29 CFR 1910.1028, Benzene
- 29 CFR 1910.1029, Coke Oven Emissions
- 29 CFR 1910.1044, 1,2-Dibromo-3-Chloropropane
- 29 CFR 1910.1045, Acrylonitrile
- 29 CFR 1910.1047, Ethylene Oxide
- 29 CFR 1910.1048, Formaldehyde
- 29 CFR 1910.1050, Methylenedianiline
- 29 CFR 1910.1051, 1,3-Butadiene
- 29 CFR 1910.1052, Methylene Chloride

Technical References

- ACGIH Threshold Limit Values
- NIOSH Pocket Guide to Chemical Hazards

Procedural References

- SWP Respiratory Protection
- SWP Confined Space Entry
- SWP Line Breaking/Blanking

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM
12/21/2011	2	RLE	Added language specific to benzene and inorganic lead

SCOPE

This procedure provides work practices to minimize the impact of heat stress caused by exposure to hot environments or working conditions.

DEFINITIONS

- **Acclimatization –** The ability to adjust to hot working conditions. This adjustment to heat, under normal circumstances, usually takes about 5 to 7 days, during which time the body will undergo a series of changes that will make continued exposure to heat more endurable.

- **Heat Index –** An accurate measure of how hot it really feels when relative humidity (RH) is added to the actual air temperature.

PROCEDURE

A. The Field Safety Officer will implement techniques for preventing heat stress-related health issues. Prevention techniques include:

1. Track the weather forecast for the job site and use forecasted information to plan daily activities. Forecasts may be obtained from:
   - www.nws.nooa.gov
   - National Weather Service Phone Numbers
   - Weather Channel TV Network

2. Provide access to shade as close as feasible to work areas, with adequate ventilation, and permit access by employees at all times. If the temperature does not exceed 85° F, provide access to shade upon request. The interior of a vehicle may not be used to provide shade unless the vehicle is air-conditioned and the air conditioner is on.
3. In situations where provision of shade is not safe or feasible, use alternative cooling measures that provide equivalent protection.
4. Schedule physically demanding and strenuous tasks, or tasks requiring full-body chemical protection, for early in the day, if possible.
5. Drink at least 6-8 ounces of cool water every 60 minutes for the entire work shift.
6. Review with employees during morning tailgate meetings the importance of drinking water and not waiting until they are thirsty, the number and schedule of water and rest breaks, the signs and symptoms of heat illness, and emergency response procedures in the HASP. When the temperature exceeds or is expected to exceed 90° F, encourage employees throughout the work shift to drink water and use shade for breaks and as needed to prevent overheating.
7. During a heat wave or heat spike (e.g., a sudden increase in daytime temperature of 9° F or more), the work day will be cut short, will be rescheduled (e.g.,

conducted at night or during cooler hours), or if possible cease for the day. If schedule modifications are not possible and workers have to work during a heat wave, increase the number of water and rest breaks, supervise workers to ensure that they stop work and take breaks, and observe closely all workers for signs and symptoms of heat illness.

8. Closely supervise employees during heat waves and when starting a new job, to ensure adequate acclimatization.
9. Use the buddy system and look for signs of heat stress. Any employee with signs of heat stress must immediately proceed to a shaded area. Signs and symptoms for various heat stress disorders and recommended first aid are listed in the following table.

Disorder	*Symptoms*	*Cause*	*Prevention/First Aid*
Heat Rash or Prickly Heat	♦ Rash ♦ Itching	♦ Hot, humid conditions ♦ Sweat doesn't evaporate easily ♦ Sweat ducts become clogged	♦ Ointments ♦ Keep skin clean and dry ♦ Good daily personal hygiene
Heat Cramps	♦ Sudden onset of muscle cramps usually in legs or arms ♦ Hot, moist skin ♦ Normal pulse ♦ Normal or slightly elevated temperature	♦ Loss of water (sweating) ♦ Loss of electrolytes ♦ Replacing water but not electrolytes	♦ Move into shade ♦ Loosen clothing ♦ Drink tepid electrolyte drinks or water ♦ Seek medical assistance if conditions persist
Heat Exhaustion	♦ Pale, clammy skin ♦ Profuse perspiration ♦ Thirst from dehydration ♦ Weakness ♦ Headache ♦ Nausea ♦ Loss of coordination	♦ Overexertion ♦ Excessive loss of water and electrolytes	♦ Move into shade ♦ Remove PPE ♦ Loosen street clothing ♦ Cool by applying damp cool compresses or ice packs ♦ Drink tepid electrolyte drinks or water ♦ Summon medical assistance
Heat Stroke	♦ Elevated temperature (>103F) ♦ Flushed, hot, dry skin ♦ Absence of sweating ♦ Delirious ♦ Rapid pulse ♦ Nausea ♦ Headache ♦ Dizziness ♦ Unconsciousness	♦ Failure of body's cooling (sweating) mechanism	♦ Summon medical assistance ♦ Move to shade ♦ Remove PPE ♦ Loosen street clothing ♦ Cool by fanning or applying damp compress or ice packs

10. The Field Safety Officer must verify that a work-rest cycle based on the heat index is implemented for site workers as applicable. Refer to the following three tables. To use the chart, read the temperature at the left and humidity across the top, the heat index is where the two intersect. For example, with a temperature of 96 and a humidity of 50%, the Heat Index is 108. Determine what the associated risk level is, based on the heat index. Use the risk level and heat index to determine the appropriate work-rest cycle.

Heat Index Chart

Relative Humidity (%)														
Temperature (F)		**40**	**45**	**50**	**55**	**60**	**65**	**70**	**75**	**80**	**85**	**90**	**95**	**100**
	110	136												
	108	130	137											
	106	124	130	137										
	104	119	124	131	137									
	102	114	119	124	130	137								
	100	109	114	118	124	129	136							
	98	105	109	113	117	123	128	134						
	96	101	104	108	112	116	121	126	132					
	94	97	100	102	106	110	114	119	124	129	136			
	92	94	96	99	101	105	108	112	116	121	126	131		
	90	91	93	95	97	100	103	106	109	113	117	122	127	132
	88	88	89	91	93	95	98	100	103	106	110	113	117	121
	86	85	87	88	89	91	93	95	97	100	102	106	108	112
	84	83	84	85	86	88	89	90	92	94	96	98	100	103
	82	81	82	83	84	84	85	86	88	89	90	91	93	95
	80	80	80	81	81	82	82	83	84	84	85	86	86	87

Heat Index Risk Level and Associated Health Effects

Heat Index	*Associated Risk*
>130	*Extreme Danger* Heat stroke highly likely with continued exposure
105-130	*Danger* Heat exhaustion and heat cramps likely and heat stroke possible with prolonged exposure and/or physical activity
90-105	*Extreme Caution* Heat cramps and heat exhaustion possible with prolonged exposure and/or physical activity
80-90	*Caution* Fatigue possible with prolonged exposure and/or physical activity

NOTES:

- Heat Index values were devised for shady, light wind conditions. Exposure to full sun may increase these values by up to 15°.
- Heat Index values were devised for the general public wearing typical lightweight summer clothing. Acclimatized workers may be able to work under conditions with a slightly higher Heat Index.
- The use of personal protective equipment, including clothing increases the heat stress load on the body.

The work-rest cycle outlined below should be implemented based on the professional judgment of the Field Safety Officer and/or the Project Health and Safety Consultant. Workers must drink 8 ounces of cool water at each break.

Heat Index	*Risk Level*	*Work-Rest Cycle*
> 130	Extreme Danger	15 minute break every 30 minutes
105-130	Danger	15 minute break every 60 minutes
90-105	Extreme Caution	15 minute break every 90 minutes
80-90	Caution	15 minute break every 120 minutes

B. The Field Safety Officer and the Project and/or Construction Manager will observe workers to verify compliance with and effectiveness of prevention techniques.

C. When an employee displays possible signs or symptoms of heat illness, the Field Safety Officer will check the sick employee and determine whether resting in the shade and drinking cool water will suffice or if emergency service providers will need to be called. WorkCare Incident Intervention (888-449-7787) should also be contacted to provide guidance on appropriate care. Do not leave a sick worker alone in the shade, as he or she can take a turn for the worse!

D. Call emergency service providers per procedures outlined in HASP if an employee displays signs or symptoms of heat illness (loss of consciousness, incoherent speech, convulsions, red and hot face), does not look OK or does not get better after drinking cool water and resting in the shade. While the ambulance is in route, initiate/continue first aid (cool the worker: place in the shade, remove excess layers of clothing, place ice pack in the armpits and join area and fan the victim). Do not let a sick worker leave the site, as they can get lost or die (when not being transported by ambulance and treatment has not been started by paramedics) before reaching a hospital!

E. In the event a heat stress related incident occurs, the Field Safety Officer will report the incident following guidelines in the HASP.

F. Supervisors will be trained on these written procedures prior to being assigned to supervise other workers. Employees will be trained on these procedures via review of the site HASP and through participation in daily site tailgate meetings.

REFERENCES

Regulatory References
Heat Illness Prevention Standard – Title 8 California Code of Regulations Section 3395

Technical References

- NOAA – National Weather Service, Heat Index, Measure of How Hot it Feels

Procedural References
None

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM
8/3/2011	1	RLE	Revised to incorporate CA Heat Illness Prevention Standard

SCOPE

This procedure provides work practices to minimize the impact of cold stress caused by exposure to cold environments or working conditions.

DEFINITIONS

- **Frostbite –** Occurs when the extremities do not get sufficient heat from the central body stores. The fluids around the cells of the body tissues freeze from exposure to low temperatures. This condition can result in damage to, and loss of, tissue. The most vulnerable areas are the nose, cheeks, ears, fingers, and toes.

- **Hypothermia –** This is the most severe form of cold stress and results from a drop in the body's core temperature. Hypothermia can occur in relatively mild temperatures if there is a wind and the person's clothing becomes wet. The signs or symptoms of hypothermia are:
  - First, uncontrollable shivering and the sensation of the cold;
  - Heartbeat slows and may become irregular;
  - Pulse weakens and blood pressure changes;
  - As the body's core temperature drops, other signs may include cool skin, slow irregular breathing, and apparent exhaustion;
  - When core temperatures are in the mid-range, the victim may become listless, confused, exhibit severe shivering, or develop severe pain in the extremities; and
  - Final signs are a significant drop in blood pressure, fatigue, and shallow respiration.

PROCEDURE

A. The Field Safety Officer will implement techniques for preventing cold stress-related health issues. Prevention techniques include:

1. Require the use of additional protective clothing.
2. Allow workers to change clothes that have become wet.
3. Provide thermal insulating materials on metal handles of tools and equipment.
4. In snowy or icy conditions, require the use of UV eye protection, as well as from blowing crystals.
5. Provide a warm and sheltered area for changing clothes and taking breaks.
6. Provide hot liquids, such as soups, warm drinks, etc. in the break area.

7. Use the buddy system and look for signs of cold stress. Any employee observed with signs of cold stress shall immediately proceed to the break area.

B. The Field Safety Officer and the Project and/orConstruction Manager will observe to verify compliance with and effectiveness of prevention techniques.

C. The Field Safety Officer will provide first aid treatment for cold stress related health issues include moving to warm area. Seek medical attention if signs or symptoms of hypothermia or frostbite are present.

REFERENCES

Regulatory References
None.

Technical References
None.

Procedural References
None.

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM

SCOPE

This procedure provides guidance for determining appropriate means for handling natural hazards that may be encountered while conducting fieldwork.

DEFINITIONS

None.

PROCEDURE

Potential exposure to natural hazards during performance of projects performed in the outdoor environment can range from minimal to substantial. The hazards discussed in this document may be present on any outdoor project and should be guarded against. Infrequent hard freezes may allow insects and snakes to be active all year round in some parts of the United States. Refer to Attachments 1 through 3 for photos and more thorough descriptions of the more common natural hazards, which might be encountered.

A. Identify type of natural hazard present.

B. When natural hazards (such as poisonous plants, feral animals, insects and snakes) are encountered, back away and evaluate the situation.

C. Develop a plan which may include any of the following:

1. Remove the natural hazard if it can be done safely.
2. Avoid the natural hazard if it cannot be removed. Additionally, use appropriate PPE or outer clothing for protection from the hazard. Refer to SWP for Personal Protective Equipment.
3. Get assistance in removing or working around the natural hazard. In some instances, this may require professional help from animal control or an insect expert.

D. In the event there is contact with the natural hazard, if it appears to be a life threatening situation, such as anaphylactic shock or a snake bite, seek medical attention immediately.

POISONOUS PLANTS

1. Poison ivy is in the form of a vine, while oak and sumac are bush-like.
2. All produce a delayed allergic hypersensitivity.
3. The plant tissues have an oleoresin, which is active in live, dead, and dried parts and may be carried through dust, contaminated articles, and the hair of animals.
4. Symptoms usually occur 24 to 48 hours after exposure resulting in burning or stinging, and weeping and/or crusted blisters.
5. The best antidote for poisonous plants is recognition and avoidance.
6. Should exposure to any of these plants occur, notify the Field Safety Officer and wash the affected area with a mild soap and water, but do not scrub the area.

TICKS

1. Ticks attach to their host's skin and intravenously feed on its blood creating an opportunity for disease transmission.
2. Covering exposed areas of the body and the use of tick repellent are two ways to prevent tick bites.
3. Periodically during the workday employees should inspect themselves for the presence of ticks. A thorough inspection should be performed at the end of the workday.
4. Notify the Field Safety Officer of any tick bites as soon as possible, medical attention may be required.

SPIDERS

1. Black Widow
   a. The black widow is a common venomous spider found in vacant rodent burrows, under stones, logs and long grass, and in hollow stumps and brush piles.
   b. If disturbed, they typically will retreat to a corner of their web but can be induced to bite only if pressed against the skin.
   c. Notify the Field Safety Officer if bitten, because neurotoxins are injected, it is important to seek immediate medical attention.

2. Brown Recluse
   a. The brown recluse or Fiddle Back Spider is another common venomous spider.
   b. It hides in dark niches and corners, where it may spin a poorly organized, irregular web.
   c. It is shy and will try to run from a threatening situation but will bite if cornered.
   d. Check boots and protective clothing for spiders prior to putting them.
   e. The bite of the brown recluse is usually painless until 3 to 8 hours later when it may become red, swollen, and tender. Notify the Field Safety Officer if bitten.
   f. Prompt medical attention can reduce the extent of ulceration and alleviate other complications that may develop.

FIRE ANTS

1. One sure sign of the presence of fire ants is their conical mounds, which are a result of the digging of their chambers.
2. The sting of a fire ant results in localized reddening of the bite area, accompanied by sharp burning sensations.
3. The first ant sting releases a chemical substance that triggers other ants of the colony to sting.
4. Anyone seeing fire ant mounds present at the work site should notify the Field Safety Officer, who will then notify the rest of the crew so the mounds may be avoided if possible.

CHIGGERS

1. Chiggers, also known as “red-bugs” or “harvest mites”, are the immature stages of a tiny red mite.
2. They inhabit areas of tall grass, associated with low, wet spots, ponds and stream banks, wild berry patches, and forest underbrush.
3. The larvae attach themselves to the clothing of people or to the fur of passing animals.
4. Wear loose-fitting clothing (if possible) when working outdoors. Apply a repellent containing DEET (N,N-diethyl-meta-toluamide), to shoes, socks, and trousers before entering chigger-infested areas. Caution: some individuals may be sensitive to DEET – always read and follow label directions

5. Vehicles should be frequently vacuumed to reduce the number of chiggers that may have been deposited.
6. Flowers of sulfur is another repellant of chiggers. Sulfur may be more benign to use than DEET on some body parts. Avoid breathing dust during application.
7. Shower or bathe at the end of each workday to ensure chiggers are removed.

FLYING INSECTS

1. Flying insects such as mosquitoes, wasps, hornets, and bees may be encountered while site activities occur.
2. Wear long-sleeved clothes and long pants treated with repellent. Do not treat unexposed skin. Use the repellent according to the manufacturer's recommendations provided on the container.
3. Personnel should report flu-like symptoms to the Field Safety Officer, medical attention may be needed.

SNAKES

1. The most effective way to prevent snakebites is to avoid snakes.
2. Personnel should avoid walking in high grass and underbrush.
3. Visual inspection of work areas should be performed prior to activities taking place.
4. The use of leather boots and long pants will be required, since more than half of all bites are on the lower part of the leg.
5. No attempts at killing snakes should be made; many people are bitten in such an attempt.
6. If a snake bites someone, notify the Field Safety Officer and seek medical services.

ALLIGATORS

1. Never approach an alligator. Always stay at least 30 yards away. Never wade or swim in areas that could contain large alligators.
2. Do not dump food or scraps into or near the water. This can attract alligators.
3. Always be aware of your surroundings and use caution and common sense.
4. If at any time personnel observe alligators at the site they will immediately inform the Field Safety Officer, who will then notify the rest of the employees and local wildlife personnel.

FERAL ANIMALS

1. Feral animals such as rats or other wildlife may be encountered during fieldwork.
2. If an animal is diseased, injured or tending a nest, they may become aggressive.
3. Notify the Field Safety Officer if feral animals are at the site, who will then notify the rest of the employees and local wildlife personnel.

ATTACHMENTS

Attachment 1, Poisonous Plants
Attachment 2, Insects
Attachment 3, Snakes
Attachment 4, Other Natural Hazards

REFERENCES

Regulatory References

None

Technical References

None

Procedural References

SWP Personal Protective Equipment

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM
7-30-12	1	DH	Last sentence corrected

Attachment 1

Poisonous Plants

Most species of poison ivy, oak, and sumac have three leaflets; hence, the saying, "Leaves of three, let it be." These plants vary significantly in appearance in different regions of the country, but in most species the flower and fruit structures arise in the angle between the leaf and the twig, the flowers are greenish in spring, and the plant's mature fruit is off-white or pale yellow-green.

Several varieties, including two species each of poison ivy, poison oak, and poison sumac and six subspecies of poison ivy (*Toxicodendron radicans*), are found in the United States. Poison ivy (see figure A below) generally grows east of the Rocky Mountains and poison oak in the West. Both poison ivy and poison sumac are found along the Gulf Coast. Poison oak prefers swampy areas in the Southeast.

Figures A1, A2: Courtesy of Lisa A. Gamer, MD; figure A3: staff photo; figure A4: Janet Robidoux

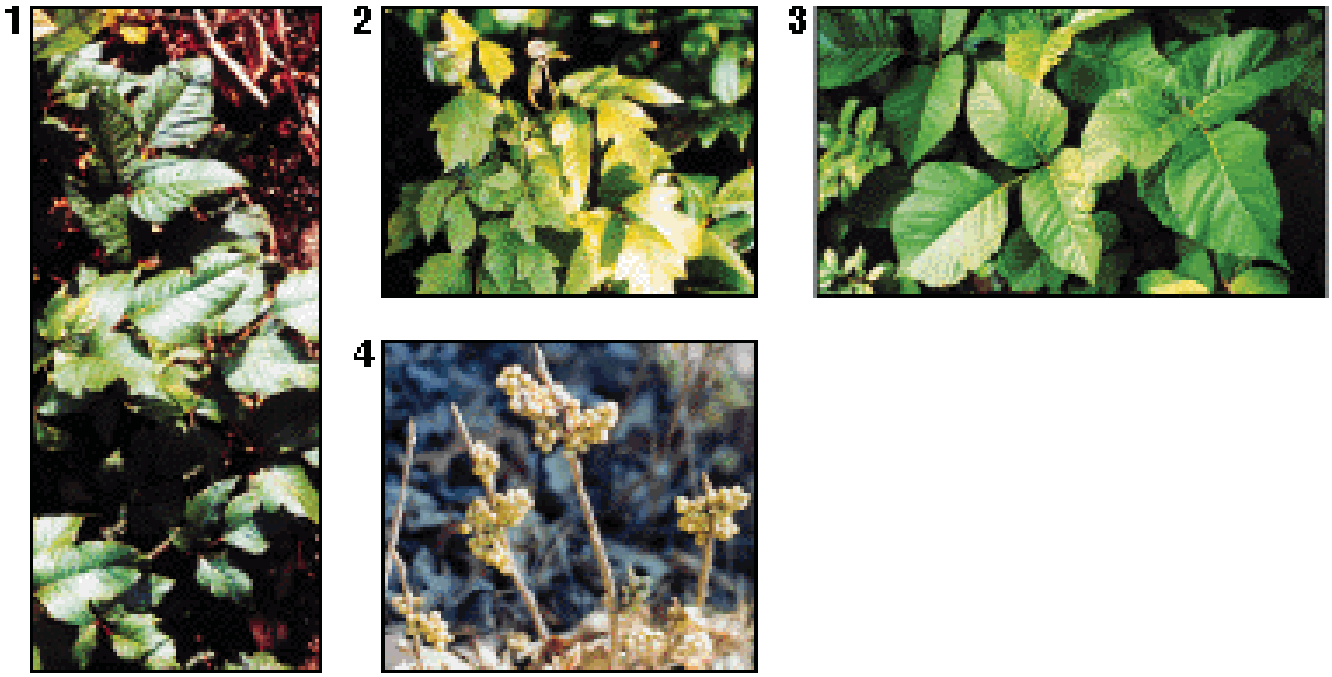


Figure A. Poison ivy (Toxicodendron radicans) can grow as a shrub or vine, but all varieties are characterized by glossy leaves that grow in clusters of three leaflets. The varieties shown here are found in Texas (1,2) and Minnesota (3). The off-white or pale yellow-green berries of poison ivy (4) often remain on the plant through the winter.

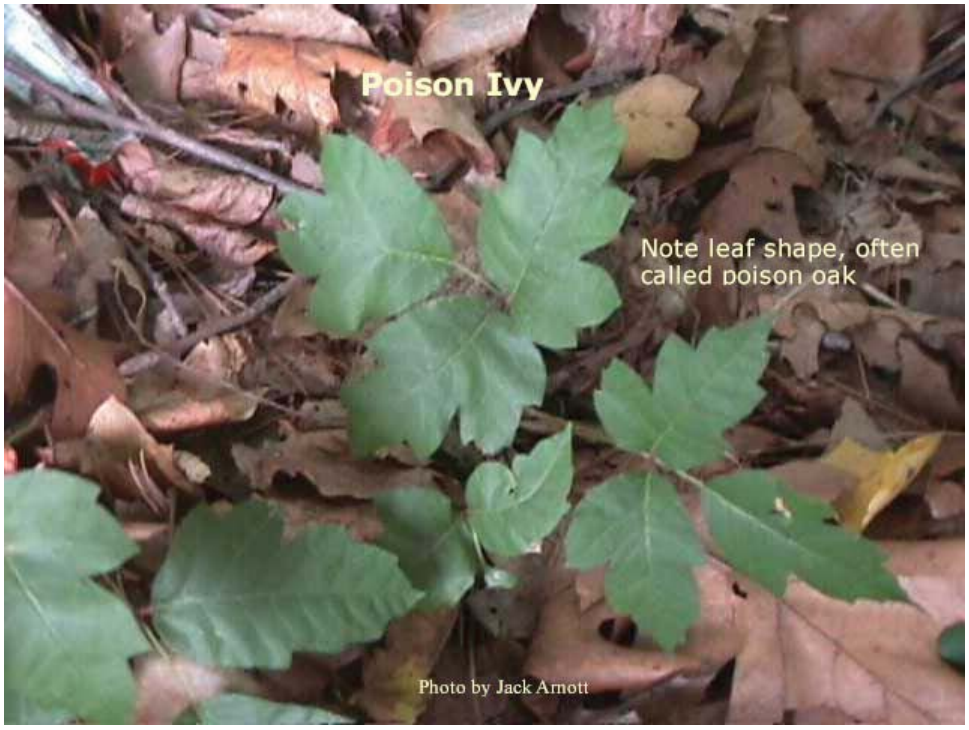
Poison Ivy

A climbing vine with three serrated-edge, pointed leaves grows in the East, Midwest and South. In the northern and western states, poison ivy grows as a non-climbing shrub.

The appearance of these plants is variable. Leaves are alternate and normally consist of three leaflets with the stalk of the central leaflet being longer than those of the other two are but can be found with five or even seven leaflets. The leaflets are two to four inches long, dull or glossy green with pointed tips. The middle leaflet is generally larger than the two laterals. The edges of the leaflets may be toothed, lobed, or smooth. Virginia Creeper (*Parthenocissus quinquefolia*) is non-poisonous vine with five leaflets that is often mistaken for poison ivy.

Poison ivy can be a shrub or a woody vine. Yellowish-green flowers occur in compact clusters in leaf axils, in June or July followed by waxy, gray-white berries about three-sixteenths of an inch in diameter in late summer.


Virginia Creeper
Parthenocissus quinquefolia
Poison Ivy
Toxicodendron radicans
Photo by Jack Arnott


Poison Ivy
Note leaf shape, often called poison oak
Photo by Jack Arnott

Poison Oak

Poison oak also has three leaves. It grows in the sandy soil of the Southeast as a small shrub. In the western United States poison oak is a very large plant that grows as a standing shrub or climbing vine. Eastern poison oak has the most "oak-looking" leaves of any of the species. It usually has multi-lobed leaves, no aerial roots on the stems, and fuzzy fruits and leaves. It loves sandy soils. Western poison oak is found only along the Pacific coast and into the mountains and it usually has aerial roots extending from the main stem.

Poison Sumac

A shrub or bush with two rows of 7-13 leaflets, most common in the peat bogs of the Northern United States and in swampy Southern regions of the country. A water loving swamp shrub (dendritic) or bush with two rows of 7-13 leaflets; growing from 6 to 20 feet in height, the Poison Sumac is found in the east from Quebec to Florida and westward along the coast to far west Texas between Shelby and Hardin counties.

Listed below are recommended actions to take to reduce the potential exposure to poisonous plant:

- Determine what types of poisonous plants may be present at the specific site.
- Use repellant sprays and coatings.
- Use netting or long sleeves with cuffs and long pants.
- Regularly inspect skin.
- Maintain a first aid kit on hand.

Attachment 2
Insects

Chiggers

Chiggers, also known as "red-bugs" or "harvest mites", are the immature stages of a tiny red mite. They inhabit areas of tall grass, associated with low, wet spots, ponds and stream banks, wild berry patches, and forest underbrush. The larvae attach themselves to the clothing of people or to the fur of passing animals. Before settling down to feed, chiggers move to a constriction, such as sock tops, waistbands, or armpits. Feeding chiggers inject a salivary fluid, which dissolves the host's cells, and then they suck up the liquefied tissue. Within a few hours, small, reddish, intensely itching welts appear. These bites may continue to itch for several days up to two weeks after the chigger is dislodged. Following are suggestions that should provide some protection from chiggers:

- Stay out of areas where chiggers are likely to be present including wood lots, pastures, roadside ditches, or other areas with tall grasses and weeds. Chiggers are especially common in moist low-lying areas.
- Wear loose-fitting clothing (if possible) when working outdoors. Vehicles should be frequently vacuumed to reduce the number of chiggers that may have been deposited.
- Apply a repellent containing DEET to shoes, socks, and trousers before entering chigger-infested areas. Caution: some individuals may be sensitive to DEET – always read and follow label directions.
- Another repellant of chiggers is flowers of sulfur. Flowers of sulfur is powdered elemental sulfur available at a drug store or pharmacy as an over-the-counter preparation. It has a slight, rotten egg smell. Areas on the body that have tight clothing up against them such as socks, waistbands, etc. may be dusted with sulfur powder. Surveyors and other field personnel state that they fill a sock with sulfur and are able to dust these areas efficiently.

Sulfur may be more benign to use than DEET on some body parts. Avoid breathing dust during application.

- Immediately after possible exposure to chiggers, take a bath, thoroughly scrubbing the body with hot soapy water. This will kill or dislodge many of the chiggers. The clothes that were worn when the bite(s) occurred should be placed in a plastic bag for temporary storage until they can be laundered.
- When bites begin to itch, one course of treatment is to apply rubbing alcohol, followed by one of the nonprescription local anesthetics. A baking soda paste, calamine lotion, or product such as "After-Bite" also will help reduce discomfort. Avoid scratching bites since this only increases irritation and may lead to a secondary infection of the bite.

Ticks

Ticks are vectors of many different diseases including Rocky Mountain spotted fever, Q fever, tularemia, Colorado tick fever, and Lyme disease. They attach to their host's skin and intravenously feed on its blood creating an opportunity for disease transmission. Covering exposed areas of the body and the use of tick repellent are two ways to prevent tick bites. Periodically during the workday employees will inspect themselves for the presence of ticks. If a tick is discovered, the following procedure should be used to remove it:

- Do not try to detach a tick with your bare fingers; bacteria from a crushed tick may be able to penetrate even unbroken skin. Fine-tipped tweezers should be used.
- Grip the tick as close to your skin as possible and gently pull it straight away from you until it releases its hold.
- Do not twist the tick as you pull and do not squeeze its bloated body. That may actually inject bacteria into your skin.
- Thoroughly wash your hands and the bite area with soap and water. Then apply an antiseptic to the bite area.
- Save the tick in a small container with the date, the body location of the bite, and where you think the tick came from.
- Notify the FSO of any tick bites as soon as possible.

Recently, Lyme disease has been the most prevalent type of disease transmitted by ticks in the United States.

Spiders

A common venomous spider is the Black Widow. The adult female is glossy black with short, almost microscopic hairs and a crimson hourglass marking on the underside of the abdomen. They are found in dark corners of barns, stables, garages and piles of boxes and crates. They have also been known to reside in vacant rodent burrows, under stones, logs and long grass, and in hollow stumps and brush piles. Generally, Black Widows are not aggressive and usually can be induced to bite only if pressed against the skin. If disturbed, they typically will retreat to a corner of their web. However, these spiders are more aggressive if they are protecting an egg sac. After a bite, a dull numbing pain in the affected extremity occurs. In addition, pain and some muscular rigidity in the abdomen or the shoulder, back, and chest may occur. The bite may also produce headache, dizziness, skin rash, nausea, vomiting, anxiety and weakness, and increased skin temperature over the affected area may be observed. Ice may be placed over the bite to reduce the pain. Bites are rarely fatal to adults, but because the black widow spider injects neurotoxins, it is important to seek immediate medical attention.

Another venomous spider common in the southern United States is the Brown Recluse or Fiddle Back Spider. The Brown Recluse is about 1/4 to 1/2 inches in body length (most adults are about the size of a United States dime to a US quarter with legs extended). Coloration ranges from tan to dark brown, with the abdomen often darker than the rest of the body. The feature that most distinguishes the brown recluse from many other harmless spiders is a

somewhat darker violin-shaped marking on top of the leg-bearing section of the body. The neck of the violin "silhouette" points towards the rear (abdomen) of the spider. The brown recluse roams at night seeking its prey. During the day, it hides in dark niches and corners, where it may spin a poorly organized, irregular web. Eggs are deposited in 1/2 inch long off-white silken egg sacs, often appearing flattened beneath and convex above. It is shy and will try to run from a threatening situation but will bite if cornered. People are sometimes bitten while they are asleep because they roll onto a brown recluse spider while it is hunting in the bed. More often the victim is bitten while putting on a shoe or piece of clothing that a spider has selected for its daytime hiding place. The bite of the brown recluse is usually painless until 3 to 8 hours later when it may become red, swollen, and tender. Later the area around the bite site may develop into an ulcerous sore from 1/2 to 10 inches in diameter. Healing often requires a month or longer, and the victim may be left with a deep scar. Prompt medical attention can reduce the extent of ulceration and alleviate other complications that may develop. It should be noted that not all brown recluse bites result in ulcerations or scarring.[1]

Fire Ants

Fire ants are approximately 1/4-inch long and live in underground chambers that typically contain over 1,000 ants. One sure sign of the presence of fire ants is their conical mounds, which are a result of the digging of their chambers. The sting of a fire ant results in localized reddening of the bite area, accompanied by sharp burning sensations. The first ant sting releases a chemical substance that triggers other ants of the colony to sting. Anyone seeing fire ant mounds present at the work site should notify the SSHO, who will then notify the rest of the crew so the mounds may be avoided if possible.

Flying Insects

Flying insects such as mosquitoes, wasps, hornets, and bees may be encountered while site activities occur. Section 3.4.4 discusses problems associated with them. Mosquitoes can be the vectors for diseases such as the West Nile Virus and Saint Louis Encephalitis, reports of which appear in the media periodically. Avoiding mosquito bites is the best way to avoid potential exposure to mosquito-borne disease. Apply insect repellant containing DEET (N,N-diethyl-meta-toluamide), wear long-sleeved clothes and long pants treated with repellent and stay indoors during peak mosquito feeding hours (dusk until dawn) to further reduce your risk.

There is currently no vaccine to protect humans against Saint Louis Encephalitis or West Nile Virus. Individuals at project sites can reduce their risk from being infected with West Nile Virus by taking the following actions to protect against mosquito bites:

- Review the hazards of West Nile Virus periodically in morning safety meetings.
- Increase protective measures when working at dawn, dusk, and in the early evening.
- Reduce the area of exposed skin when working outdoors. Long-sleeved shirts with sleeves rolled down are recommended. Understand that mosquitoes may bite through thin clothing, so personnel should evaluate the actual Level D clothing worn, for example, heavy, long

sleeve work shirts and heavy dungarees/jeans may be indicated. Activity at projects where disposable coverall use (i.e., Tyvek®) is specified, further reduces the risk of mosquito bites.

- For activities where only Level D PPE is specified, consider using disposable coveralls when working in wooded, highly vegetated, or swampy areas.
- Use an insect repellent containing approximately 30 percent DEET. In concentrations greater than 35 percent, DEET provides no additional protection. Use the repellent according to the manufacturer's directions provided on the container. Use just enough repellent to cover exposed skin and clothing. Do not treat unexposed skin. Frequent reapplication or saturation is unnecessary for effectiveness. Avoid prolonged and excessive use of DEET.
- When additional protection against mosquitoes is necessary, commercially prepared "clothing and gear" insect repellants containing 0.5 percent permethrin may be used. These repellants, such as Repel Permanone™ are available in the sporting goods departments at major retailers. Clothing and gear insect repellants are not for use on skin. Use the repellent according to the manufacturer's recommendations provided on the container.
- After returning from outdoor field activities, wash treated skin with soap and water.
- Personnel should report flu-like symptoms to the FSO.

West Nile Virus

The Centers for Disease Control and Prevention report that human illness from West Nile virus is rare, even in areas where the virus has been reported. The chance that any one person is going to become ill from a mosquito bite is low. West Nile virus is spread by the bite of an infected mosquito, and can infect people, horses, many types of birds, and some other animals. Most people who become infected with West Nile virus will have either no symptoms or only mild ones. On rare occasions, West Nile virus infection can result in a severe and sometimes fatal illness known as West Nile encephalitis (an inflammation of the brain). The risk of severe disease is higher for persons 50 years of age and older. There is no evidence to suggest that West Nile virus can be spread from person to person or from animal to person.

Saint Louis Encephalitis

The Centers for Disease Control and Prevention report mild infections occur without apparent symptoms other than fever with headache. More severe infection is marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, occasional convulsions (especially in infants) and spastic paralysis. There is no evidence to suggest that Saint Louis encephalitis can be spread from person to person or from animal to person.

Table 1

Flying Insect Information

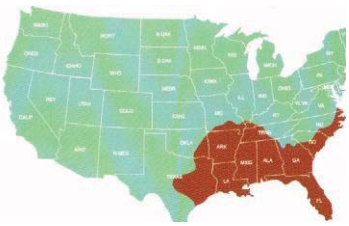
Organism	Description	Habitat	Problem	Severity	Protection
Hornet	One inch long with some body hair. Abdomen is mostly black.	Round, paper like nest hanging from trees, shrubs, or under eaves of buildings.	One nest may contain up to 100,000 hornets that will attack in force at the slightest provocation.	Severe pain, allergic reactions similar to bees.	Do not come near or disturb nest. If a hornet investigates you, do not move.
Mosquito	Small, dark, fragile body with transparent wings. From 1/8 to 1/4 inch long.	Where water is available for breeding.	Bites and sucks blood. Itching and swelling result.	Can transmit encephalitis and other diseases. Scratching causes secondary infections.	Use plenty of insect repellant and wear gloves. Stay in windy areas.
Wasp	Very thin waist. Color can be black, yellow or orange with stripes.	Underground nest. Paper-like honeycomb nest in abandoned buildings hollow trees, etc.	Stings. Some species will attack if you get too close to the nest.	Severe pain, allergic reactions similar to bees. Can be fatal.	Avoid Nest. Do not swat at them.
Bee	Generally have yellow and black stripes and two pair of wings.	Hollow logs, underground nest, old buildings,	Stings when annoyed. Leaves venom sac in victim.	If person is allergic, nausea, shock, constriction of the airway can result. Death may result.	Be careful and watch where you walk. Cover exposed skin. Avoid areas where bees are swarming. Avoid wearing sweet fragrances and bright clothing. Move slowly or stand still when bees are swarming about you.

Attachment 3
Snakes

Copperhead


Coral

Cottonmouth

Diamondback Rattlesnake


Water Moccasin

The most effective way to prevent snakebites is to avoid snakes in the first place. Personnel should avoid walking at night or in high grass and underbrush. Visual inspection of work areas should be performed prior to activities taking place. The use of leather boots and long pants will be required, since more than half of all bites are on the lower part of the leg. No attempts at killing snakes should be made; many people are bitten in such an attempt.

If a snake bites someone, the following treatment should be initiated:

- Keep patient calm
- Notify emergency medical services
- Wash the wound and keep the affected body part still
- Apply direct pressure to site of bite if bleeding is extreme
- Keep the affected area lower than the heart
- Carry a victim who must be transported, or have him/her walk slowly
- Transport to closest medical facility

Attachment 4
Other Natural Hazards

Alligators

Alligators live in nearly all Louisiana parishes but are most common in the major river drainage basins and large lakes in the southern portion of the state. Most attacks involve animals over six feet long. Alligators become more active in the beginning of March, peaking in May, which is their mating season. Females will nest in June - July, and the eggs will hatch in August and September. Even a small amount of impounded water may contain a large alligator. Twilight and night are prime times for alligator attacks. Never approach an alligator. Always stay at least 30 yards away. Never wade or swim in areas that could contain large alligators. Do not dump food or scraps into or near the water. This can attract alligators. Always be aware of your surroundings and use caution and common sense. If at any time personnel observe alligators at the site they will immediately inform the SSO, who will then notify the rest of the crew and local wildlife personnel.

Feral Animals

Feral animals such as rats or other wildlife may be encountered during fieldwork. Typically, feral animals are as afraid or more afraid of humans and when encountered will run away from human contact. However, if an animal is diseased, injured or tending a nest, they may become aggressive. The most common disease encountered with feral animals is rabies. Signs of a rabies-infected animal include:

- Changes in an animal's behavior;
- General sickness;
- Difficulty swallowing;
- An increase in drool or saliva;
- Wild animals that appear abnormally tame or sick;
- Animals that may bite at everything if excited;
- Difficulty moving or paralysis; and
- Death.

Animals in the early stage of rabies may not have any signs, although they can still infect you if they bite you. The incubation period is the time from the animal bite to when signs appear. In rabies, it is usually 1-3 months. However, it can last as long as several years. Once the virus reaches the brain or spinal cord, signs of the disease appear. **In the event an animal is encountered on the site, do not approach it.** If it exhibits one or more of the signs listed above, call local wildlife personnel to get assistance.

	SAFE WORK PRACTICE	
ERM	SOP #:	7
	Title:	Personal Protective Equipment
	Last Rev.:	1/12/2011
	Page:	1 of 3

SCOPE

This procedure provides guidance for determining appropriate Personal Protective Equipment (PPE) to be worn at the job site, based on new tasks and chemical or physical agents identified in the field. The initial determination for proper PPE is completed as part of development of the HASP.

DEFINITIONS

None.

PROCEDURE

A. The Field Safety Officer will complete a hazard assessment of the tasks involved and identify the appropriate PPE based on the task and the chemical or physical agents involved. The written hazard assessment certification must be documented in the HASP.

B. The Field Safety Officer will communicate to employees the PPE requirements for the tasks involved.

C. The Field Safety Officer will provide PPE that properly fits the employee(s).

D. The Field Safety Officer will conduct daily site walks to verify appropriate use of PPE.

E. A H&S team member or Field Safety Officer will provide training to the employees which includes at least the following:

1. When PPE is necessary;
2. What PPE is necessary;
3. How to properly don, doff, adjust and wear PPE;
4. The limitations of the PPE; and
5. The proper care, maintenance, useful life and disposal of the PPE.

F. Re-training by the Field Safety Officer may be required if:

1. Changes at the job site make previous training obsolete.
2. Changes in the types of PPE make previous training obsolete.
3. Inadequacies in an affected employee's knowledge or use of PPE indicate the employee requires additional training.

G. Types of PPE include the following:

1. Eye and Face Protection

a. All eye and face protection must comply with ANSI Z87.1-1989.
b. Safety glasses
   - Side shields must be worn when there is a hazard of flying objects.
   - Prescription glasses must meet the ANSI Z87.1-1989 requirements or must have eye protection over them meeting the ANSI standard requirements.
c. Chemical goggles
d. Face shield

2. Head Protection
   a. All head protection (hard hats) must comply with ANSI Z89.1-1989.

3. Foot Protection

   All foot protection must comply with ANSI Z41-1991.
   a. Safety-toed shoes
   b. Rubber boots or rubber safety-toed boots

4. Hand Protection

   Hand protection must be selected based on the performance characteristics of the hand protection relative to the task(s) to be performed, conditions present, duration of use and the hazards and potential hazards identified. A member of the H&S team must verify and document selection of appropriate chemical resistant gloves.
   a. Work gloves, such as leather or cotton
   b. Chemical gloves, such as nitrile, neoprene, Viton, butyl rubber
   c. Cut-resistant gloves, such as Kevlar

5. Hearing Protection
   a. Ear plugs
   b. Ear muffs

6. Respiratory Protection (Refer to SOP – 9)

7. Other PPE
   a. Disposable Coveralls
   b. Fire Resistant Clothing

REFERENCES

Regulatory References

- 29 CFR 1910.132, Personal Protective Equipment, General Requirements
- 29 CFR 1910.133, Eye and Face Protection
- 29 CFR 1910.135, Head Protection

- 29 CFR 1910.136, Foot Protection
- 29 CFR 1910.138, Hand Protection

Technical References

- ANSI Z87.1-1989, American National Standard Practice for Occupational and Educational Eye and Face Protection
- ANSI Z89.1-1989, American National Standard for Personal Protection – Protective headwear for Industrial Workers – Requirements
- ANSI Z41-1991, American National Standard for Personal Protection – Protective Footwear

Procedural References

- SWP Respiratory Protection

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM

	SAFE WORK PRACTICE	
ERM	SOP #:	8
	Title:	Respiratory Protection
	Last Rev.:	1/12/2011
	Page:	1 of 4

SCOPE

This procedure identifies the work practices and regulatory requirements with regard to respiratory protection.

DEFINITIONS

- **Escape Respirators** – Respiratory devices providing protection only during escape from hazardous atmospheres.

- **Hazardous Atmosphere** - (1) Any atmosphere containing a toxic or disease-producing gas, vapor, dust, fume, or mist, either immediately or not immediately dangerous to life or health; or (2) Any oxygen-deficient atmosphere.

- **Immediately Dangerous to Life or Health (IDLH)** – A condition that poses a threat of exposure to airborne contaminants when that exposure is likely to cause death or immediate, or delayed, permanent adverse healths effects, or prevent escape from such an environment.

- **Oxygen Deficient Atmosphere** – An atmosphere containing less than 19.5 percent oxygen by volume.

PROCEDURE

A. The Field Safety Officer must verify that all employees required to wear respiratory protection at the jobsite are qualified (i.e., have completed a medical evaluation, been fit-tested and are trained.)

B. An H&S team member will select respiratory protection based on the hazards at the jobsite. Selection of respiratory protection will be completed as part of the hazard assessment when completing the HASP. If unanticipated conditions are encountered at the jobsite requiring a change in respiratory protection, follow the respiratory protection upgrade process defined in the site specific HASP. Additionally , the Field Safety Officer should contact a H&S team member to re-evaluate PPE requirements

C. Inspection

1. All workers must inspect all non-emergency respirators before each use and during cleaning.
2. The Field Safety Officer must inspect respirators used for emergency use, at least monthly and in accordance with the manufacturer's recommendations, and must check for proper function before and after each use. See Section G of this SOP for situations requiring emergency use respirators.
3. Respirator inspection shall include:

- Check for tightness of connections.
- Check condition of inlet coverings, head harness, valves, connecting tubes, harness assembly, hoses, filter, cartridges, canisters, end-of-service-life indicator, electrical components, and shelf-life date(s).
- Check all rubber and elastomeric parts.
- Check all air cylinders for proper charge.
- For respirators maintained for emergency use, the inspection must be documented with the date of the inspection, the name of the inspector, the findings, remedial action taken, and a serial number or other means if identifying the respirator. A tag or label must be affixed to the storage compartment and replaced with a subsequent inspection tag/label.

4. Any respirator that does not pass inspection shall be immediately removed from service to be repaired or replaced.

D. Use

1. No facial hair is allowed which could come between the sealing surface of the face piece and the face, or interfere with the valve function.
2. Eye protection must be worn such that it does not interfere with the face piece seal.
3. Conduct a seal-check (positive and negative pressure) every time the respirator is donned.
4. The Field Safety Officer must evaluate continuing respirator effectiveness
   - Maintain surveillance of work area to assess jobsite conditions and respirator wearer(s) exposure or stress levels have not changed;
   - Direct respirator wearers to leave the work area:
     - to wash their faces and face pieces to prevent eye or face irritation associated with respirator use;
     - if a respirator wearer detects vapor or gas breakthrough, changes in breathing resistance or leakage of the face piece;
     - to replace the respirator filter, cartridge or canister elements.
   - If a respirator wearer detects breakthrough, changes in breathing resistance or leakage, they must replace or repair the respirator before returning to the work area. Change schedules for substances other than particulates will be addressed in the HASP or Job Hazard Analysis.

E. Maintenance

1. Clean and sanitize respirator after each use.
2. If respirators are not assigned, each respirator must be cleaned and sanitized before being used by a different employee.

3. Respirators being used for emergency use shall be cleaned after being used. These respirators must contain a tag or label on them telling the last date they were inspected and who inspected them.
4. Each respirator shall be cleaned in warm water (not exceeding 110^0F or 43^0C) with sanitizers that effectively clean the respirator and contain an antibacterial agent. For additional cleaning procedures, refer to 29 CFR 1910.134, Appendix B-2, Respirator Cleaning Procedures (Mandatory).
5. Replacement of parts or repairs may be done only by persons trained in proper respirator maintenance and assembly.
6. Replacement parts used shall be only those designated specifically for the respirator being repaired.
7. Any respiratory equipment not repairable, must be destroyed and discarded.

F. Site workers must store respirators to protect them from:

1. physical damage including face piece or valve deformation;
2. contamination;
3. dust;
4. sunlight;
5. extreme temperatures;
6. excessive moisture; and
7. damaging chemicals.

G. Special Circumstances (including but not limited to Immediately Dangerous to Life and Health (IDLH) or unknown concentrations)

ERM employee entry into areas where atmospheres are IDLH or of unknown/suspected high concentrations is not authorized unless the NAHSD concurs. If the Field Safety Officer or Project/Construction Manager encounters special circumstances in the field which were not anticipated in the HASP, such as an IDLH atmosphere or an atmosphere with unknown concentrations or unknown constituents, contact a H&S team member for assistance. Conditions requiring Self-Contained Breathing Apparatus (SCBA) or airline respiratory protection may require additional medical evaluation, fit-test of a different face piece and additional training. Additionally, when using supplied air, additional criteria apply regarding breathing air quality, quantity and flow. For additional information, refer to 29 CFR 1910.134(i).

REFERENCES

Regulatory References

- 29 CFR 1910.134, Respiratory Protection

Technical References

None

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM

	SAFE WORK PRACTICE	
ERM	SOP #:	9
	Title:	Confined Space Entry
	Last Rev.:	1/12/2011
	Page:	1 of 2

SCOPE

This procedure provides work practices to meet regulatory requirements for working in confined spaces and to ensure that proper planning has occurred as part of development of the HASP. It is meant as an information document for ERM subcontractors who perform confined space entry. There are two types of confined spaces covered by this procedure: a permit-required confined space and a non-permit confined space.

ERM employees are not authorized to enter confined spaces. If an emergency circumstance occurs where entry into a permit-required confined space is required, the NAHSD must be consulted and must concur with the entry.

DEFINITIONS

- **Confined Space –** An area which:
  - Has adequate size and configuration for employee entry;
  - Has limited means of access or egress; and
  - Is not designed for continuous employee occupancy.

- **Entry into a Confined Space –** The action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

- **Non-permit Confined Space** - A confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

- **Permit-Required Confined Space –** A confined space that has one or more of the following characteristics:
  - Contains or has a potential to contain a hazardous atmosphere;
  - Contains a material that has the potential for engulfing an entrant;
  - Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or
  - Contains any other recognized serious safety or health hazard.

PROCEDURE

A. It is ERM's standard policy and practice to never enter into a confined space, as defined above. In situations where an ERM subcontractor enters a confined space, a detailed written Confined Space Entry Program must be developed for the specific site and

specific conditions anticipated to be encountered. Under these circumstances, the subcontractor's Confined Space Entry Program must be reviewed and approved by the NAHSD, and attached as part of the site specific HASP.

B. Additionally, specific training must be completed for any individual(s) involved in confined space entry in accordance with 29 CFR 1910.146.

REFERENCES

Regulatory References

- 29 CFR 1910.146, Permit-Required Confined Spaces

Technical References

None

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Clarified ERM position on our employees entering confined spaces of any type, renumbered, integrated with ERM H&S program, removed references to RCM

	SAFE WORK PRACTICE	
ERM	SOP #:	10
	Title:	Drum Handling
	Last Rev.:	1/12/2011
	Page:	1 of 2

SCOPE

This procedure identifies the work practices and regulatory requirements regarding drum handling at the jobsite.

DEFINITIONS

None.

PROCEDURE

A. When handling drums, follow the general drum handling requirements listed below:

1. Hazardous substances and contaminated, liquids and other residues must be handled, transported, labeled, and disposed of in accordance with 29 CFR 1910.120(j).
2. When practical, drums and containers must be inspected and their integrity must be assured prior to being moved.
3. Unlabeled drums and containers must be considered to contain hazardous substances and handled accordingly until the contents are positively identified and labeled.
4. Drums must be handled only if necessary. Prior to handling, all personnel should be warned about the hazards of handling and instructed to minimize handling as much as possible.
5. Drums and containers that cannot be moved without rupture, leakage, or spillage must be emptied into a sound container using a device classified for the material being transferred.
6. A ground-penetrating system or other type of detection system or device will be used to estimate the location and depth of buried drums or containers.
7. Soil or covering material must be removed with caution to prevent drum or container rupture.
8. Fire extinguishing equipment meeting the requirements of 29 CFR Part 1910, Subpart L, must be on hand and ready for use to control incipient fires.

B. When opening drums and containers, such as for sampling or waste characterization purposes, handling shock sensitive wastes, radioactive wastes, or when shipping drums, a site specific drum handling plan must be developed, reviewed by the NAHSD, and included in the HASP

REFERENCES

Regulatory References

- 29 CFR 1910.120(j), Handling Drums and Containers

- 29 CFR 1926.65(j), Handling Drums and Containers

Technical References
None

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM, changed development and approval requirement for site-specific drum handling plan

SCOPE

This procedure provides requirements and safe work practices for personnel involved in excavation work. Please review the Excavation Safety Checklist (Attachment 1) in verifying that this procedure is being followed.

DEFINITION

- **Accepted Engineering Practices** – those requirements, which are compatible with standards of practice required by a registered professional engineer.
- **Benching (Bench System)** – a method of protecting employees from cave-ins by excavating the sides of an excavation from one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.
- **Cave-in** –the separation of a mass of soil or rock from the sides of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity to entrap, bury, or otherwise injure and immobilize a person.
- **Competent Person** - one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them
- **Excavation** - any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.
- **Face or Sides** – the vertical or inclined earth surfaces formed as a result of excavation work.
- **Hazardous Atmosphere** – an atmosphere which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen deficient, toxic, or otherwise harmful, may cause death, illness, or injury.
- **Protective System** –a method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. Protective Systems include support systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.
- **Registered Professional Engineer** – a person who is registered as a professional engineer in the state where the work is to be performed.
- **Shield (Shield System)** –a structure that is able to withstand the forces imposed on it by a cave-in and thereby protect workers with in the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses.

- **Shoring (Shoring System)** – a structure such as a metal hydraulic lift, mechanical or timber shoring system that supports the sides of an excavation and which is designed to prevent cave-ins.
- **Sloping (Sloping System)** –a method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation. The angle of incline required to prevent a cave-in varies with differences in factors such as the soil type, environmental conditions of exposure, and application of surcharge loads.
- **Support System** – means a structure such as underpinning, bracing, or shoring, which provides support to an adjacent structure, underground installation, or the sides of an excavation.

PROCEDURE

A. Prior to the start of excavation, the Project/Construction Manager must complete the ERM subsurface clearance procedure to verify clearance of subsurface hazards at the excavation site. Subcontractor Contact should identify the location of utility installations (e.g., sewer, telephone, electric, water lines, etc.) that may be expected to be encountered during excavation.

1. Contact the utility company (-ies) and advise of proposed work requesting them to establish the location of the underground installations.
2. Underground installations must be protected, supported, or removed as necessary to safeguard employees.

B. When equipment is operated adjacent to an excavation or is required to approach the edge of an excavation, a warning system, such as barricades, hand or mechanical signals, or stop logs must be utilized. The system should be inspected:

1. Prior to the start of work and as needed throughout the shift.
2. After every rainstorm or other site condition change that could increase the instability of the excavation.

C. To prevent exposure to harmful levels of atmospheric contaminants or oxygen deficiency (atmospheres containing less than 19.5% oxygen), the following requirements apply:

1. The atmospheres in the excavation must be tested before employees enter excavations greater than 4 feet in depth per SWP 9 Confined Space Entry
2. The proper respiratory protection should be provided per SWP 8 Respiratory Protection.

3. When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, testing must be conducted as often as necessary to verify that the atmosphere remains safe.

D. Emergency rescue equipment, such as breathing apparatus, a safety harness and line, or a basket stretcher, must be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation. The equipment should be attended when in use.

E. Employees should not work in excavations where water has accumulated or is accumulating, unless protective measures such as special support or shield systems to protect from cave-ins have been implemented to protect the employees against the hazards posed by water accumulation.

1. If water is controlled or prevented from accumulating by the use of water removal equipment, a competent person must monitor the water removal equipment and operations.

2. Diversion ditches, dikes, or other suitable means must be used to prevent surface water from entering the excavation and to provide drainage of the area adjacent to the excavation.

3. Excavations subject to runoff from heavy rains require an inspection by a competent person.

I. Stability of other structures endangered by excavation operations must be stabilized by support systems such as shoring, bracing, or underpinning for the protection of employees. A registered professional engineer should be consulted for determination of stability of structures that may be affected during the excavation work.

K. The ERM subcontractor contact should verify materials and equipment are free from damage or defects that might impair their proper function.

L. Daily inspections of excavations, the adjacent areas, and protective systems must be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. A helpful excavation safety checklist is provided as Attachment 1.

ATTACHMENT

- Excavation Safety Checklist

REFERENCES

Regulatory References

- 29 CFR 1926.650 Scope,Application, and Definitions Aapplicable to this Subpart (Subpart P).
- 29 CFR 1926.651 Specific Excavation Requirements.
- 29 CFR 1926.652 Requirements for Portective Systems.

Technical References

None

Procedural References

ERM's Subsurface Clearance Procedure

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM

ATTACHMENT 1: EXCAVATION SAFETY CHECKLIST

Job Site	Yes	No	NA	Excavation	Yes	No	NA
Prior to starting the job, were utilities notified and underground services located?	☐	☐	☐	Have the supervisors and workers been trained in excavation safety laws and procedures?	☐	☐	☐
Were overhead transmission lines noted and precautions taken to ensure that equipment does not come in contact with them?	☐	☐	☐	Have building, utility poles, trees and any other surface encumbrances or destabilizing forces been taken into consideration?	☐	☐	☐
Have adequate signs been posted and barricades provided?	☐	☐	☐	Has soil classification been done?	☐	☐	☐
Are the workers wearing reflective vests, if necessary?	☐	☐	☐	Has the appropriate means of safeguarding the excavation by OSHA requirements been determined by a Competent Person?	☐	☐	☐
Are vehicles, equipment, and spoil piles correctly placed to allow for the safe passage of traffic and the progress of the construction?	☐	☐	☐	For excavations 4 feet (1.2 meters) deep or more, are ladders, steps or ramps available within25 feet (7.6 meters) of lateral travel?	☐	☐	☐
Has traffic control (fire depts., etc.) been notified?	☐	☐	☐	Are all open pits or shafts either covered or barricaded?	☐	☐	☐

Job Site	Yes	No	NA	Excavation	Yes	No	NA
Is the appropriate safety gear on site?	☐	☐	☐	Are spoil piles at least 2 feet from the edge of the excavation and properly sloped?	☐	☐	☐
Have undermined structures been shored, braced or underpinned, or has a registered Prof. Engineer determined that such measures are not necessary?	☐	☐	☐	Have confined-space atmospheric hazards been considered?	☐	☐	☐
Are utilities crossing the excavation supported from above and does protection from falling materials exist?	☐	☐	☐	Do bridges and walkways have standard guardrails?	☐	☐	☐
				Have means been provided to remove water from the excavation?	☐	☐	☐
				Competent person available on site at all times.	☐	☐	☐

NOTE: Shoring and shielding must be removed in a manner that ensures the safety of workers, and excavations must be back filled as soon as work is completed.

SCOPE

This procedure defines minimum expectationse for the safe use and maintanence of tools and equipment, including tools and equipment which may be furnished by employees.

DEFINITIONS

Torque: The circular or rotating motion in tools such as drills, impact wrenches, saws, etc. which results in a strong twisting force

PROCEDURE

A. HAND TOOLS

1. Every tool was designed to do a certain job and employees should use tools only for their intended purpose.
2. Maintain hand tools in good condition - sharp, clean, oiled. .
3. Do not force tools beyond their capacity or use "cheaters" to increase their capacity. Do not use tools for pry bars.

B. PORTABLE POWER TOOLS

1. GUARDING

Guards or shields must be installed on all power tools before issue. Do not use improper tools or tools without guards in place.

C. OPERATING PRACTICES

1. Loose clothing, rings, and other jewelry must not be worn around operating machines. Keep sleeves buttoned or rolled up.
2. Keep fingers away from moving parts. Shut off machines to remove waste. Use a brush to clean up and debur. Be sure machine is fully stopped and not coasting.
3. Inspect at least daily before start-up. Look for loose or damaged parts and inadequate lighting.
4. Use clamps or vise to hold work.
5. Many machines have Safety Interlocking devices. Verify their operation prior to use , and NEVER BYPASS SAFETY INTERLOCK DEVICES.
6. Examine each power tool before using it. Look for damaged parts, loose fittings, frayed or cut electric cords. Tag and return defective tools for repairs.

7. Some machines use both pneumatic and electric power. Both must be shut off to make repairs or to adjust moving parts. Bleed down tool to remove any stored energy left in the system.
8. Be prepared in case of jamming**.** Maintain good footing; and use two hands, Circular saws, chain saws and percussion tools shall not be equipped with a locking switch or trigger
9. Flying objects **c**an result from operating almost any power tool. Be aware of others working around you and use proper eye protection.
10. Keep moving parts directed away from your body. Never touch a powered part unless power source is disconnected (such as drill chucks, blades, and bits).
11. Ground Fault Circuit Interrupters (GFCI**) a**re required when using electrical power tools.

REFERENCES

Regulatory References

- 29 CFR 1910.241 Definitions.
- 29 CFR 1910.242 Hand and Portable Powered Tools and Equipment, General.
- 29 CFR 1910.243 Guarding of Portable Power Tools.
- 29 CFR 1910.244 Other Portable Tools and Equipment.
- 29 CFR 1926.300 General Requirements.
- 29 CFR 1926.301 Hand Tools.
- 29 CFR 1926.302 Power-operated Hand Tools.

Technical References

None

Procedural References

SWP 7 Personnel Protective Equipment

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM

	SAFE WORK PRACTICE	
ERM	SOP #:	14
	Title:	Fall Prevention and Fall Protection
	Last Rev.:	1/12/2011
	Page:	1 of 2

SCOPE

This procedure provides work practices to meet regulatory requirements regarding fall prevention/fall protection for all employees working 6 feet or more above a lower level.

DEFINITIONS

None.

PROCEDURE

A. Fall prevention/protection is required when there is an unprotected side or edge which is 6 feet or more above a lower level. Example situations include but are not limited to:

1. Horizontal walking/working surfaces;
2. Leading edges;
3. Holes in flooring or walls;
4. Formwork and reinforcing steel;
5. Ramps, runways and other walkways;
6. Excavations;
7. Roof work;
8. Precast concrete erection; and
9. Walking/working surfaces not otherwise addressed.

B. In addition, protection from falling objects must also be provided to employees working below, by requiring the use of head protection as well as one of the following methods:

1. Erect toeboards, screens or guardrail systems to prevent objects from falling from higher levels; or
2. Erect a canopy structure and keep potential objects far enough from the edge so they would not go over if they were accidentally misplaced; or
3. Barricade the area into which the objects could fall and prohibit employees from entering into the barricaded area.

C. Where fall prevention, in the form of a physical barrier, is not feasible, and a fall hazard exists, fall protection is mandatory. Fall protection can take on many forms depending on the job task being performed, i.e., permanent and temporary vertical and horizontal lifeline systems, full body harness, shock absorbing lanyards, nets, retractable devices, etc. These are some of the most common methods of fall protection available.

D. In the event work is to be conducted at a height greater than 6 feet, fall prevention and/or fall protection requirements must be incorporated into the HASP. The H&S team must develop a fall prevention/protection plan which will incorporate the use of

physical barriers, administrative controls or fall protection equipment. This plan will be included in the HASP for the site.

E. Additionally, training must be completed for any individual who will be using fall prevention / fall protection equipment. The Field Safety officer must verify all workers have received the appropriate training relative to fall prevention / fall protection.

REFERENCES

Regulatory References

- 29 CFR 1926.501, Duty to Have Fall Protection
- 29 CFR 1926.502, Fall Protection Systems Criteria and Practices

Technical References

None

Procedural References

None

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Integrated with ERM H&S program, removed references to RCM

SCOPE

This procedure defines requirements for safe operation of heavy equipment operation. Heavy equipment includes backhoes, cranes, derricks, dozers, loaders, skid steers, and trucks. It is meant as a reference document to supply to ERM subcontractors to communicate minimum requirements for these activities.

ERM personnel are not authorized to operate heavy and materials handling equipment discussed in this Safe Work Practice.

DEFINITIONS

- **Crane** - means a mechanical device, intended for lifting or lowering a load and moving it horizontally, in which the hoisting mechanism is an integral part of the machine. A crane may be a fixed or mobile machine.
- **Derrick** - A "derrick" is an apparatus consisting of a mast or equivalent member held at the head by guys or braces, with or without a boom, for use with a hoisting mechanism and operating ropes.

PROCEDURE

A. TRAINING

1. Equipment operators must demonstrate training and experience with each piece of equipment before receiving authorization to begin work.

B. INSPECTION

1. All heavy equipment must meet applicable design standards (i.e., ANSI, etc.).
2. The equipment must have a copy of the most recent annual and periodic inspections onboard.
3. The Subcontractor Contact or a designated qualified person must inspect all heavy equipment prior to operation (See Crane and Derrick Inspection Checklist), to verify proper working condition.
4. A copy of the manufacturer's operating manual must be carried on all heavy equipments. The manual must include a load-rating chart that indicates safe loads in various configurations, wire and cable minimums and maximums, and any special operating considerations.

C. OPERATION

1. The Subcontractor must have a standard operating procedure that is implemented for heavy equipment operation.
2. Equipment must be operated in accordance with the manufacturer's instructions and recommendations.
3. Before starting equipment, the equipment operator must make sure no one is working on or near the machinery. If equipment must be operated in close proximity to other operations, a spotter will be required to work with the equipment operator. The spotter and equipment operator must be in radio communication
4. Equipment operators must wear seatbelts and operate equipment in accordance with safe operating speeds and loading
5. When working on slopes, the equipment should be positioned perpendicular to the slope with the center of gravity of the equipment on the lower edge of the slope.
6. Dump trucks must lower their beds **PRIOR** to moving from the dump site
7. All employees should wear appropriate personal protective equipment in accordance with SWP 7 Personal Protective Equipment.
8. Equipment operators should not get on or off a moving machine.

Note: If heavy equipment is located near overhead power lines, contact a member of the H&S team to determine safe working distances.

ATTACHMENTS

- Crane and Derrick Inspection Checklist

REFERENCES

Regulatory References

- 29 CFR 1910.181 Derricks.
- 29 CFR 1926.550 Cranes and Derricks.
- 29 CFR 1926.600 Equipment.
- 29 CFR 1926.601 Motor Vehicles.
- 29 CFR 1926.602 Material Handling Equipment.

Technical References

None

Procedural References

SWP 7 Personal Protective Equipment

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM

ATTACHMENT 1

CRANE AND DERRICK INSPECTION CHECKLIST

Prior to operation each day, inspect:

1. ☐ All control mechanisms for maladjustment interfering with proper operation.
2. ☐ All control mechanisms for excessive wear of components and contamination by lubricants or other foreign matter.
3. ☐ All operator aids, motion and load limiting devices, and other safety devices for malfunction and inaccuracy of settings.
4. ☐ All chords and lacing.
5. ☐ All hydraulic and pneumatic systems - with particular emphasis given to those which flex in normal operation of the crane.
6. ☐ Hooks and latches for deformation, chemical damage, cracks, and wear.
7. ☐ Rope for proper spooling onto the drum(s) and sheave(s) and rope reeving for compliance with crane manufacturer's specifications.
8. ☐ Electrical apparatus for malfunctioning, signs of excessive deterioration, dirt, and moisture accumulation.
9. ☐ Hydraulic system for proper oil level.
10. ☐ Tires for recommended inflation pressure (mobile cranes).
11. ☐ Wedges and supports for looseness or dislocation (climbing tower cranes).
12. ☐ Braces and guys supporting crane masts; anchor bolt base connections for looseness or loss of preload (tower cranes and derricks).
13. ☐ Derrick mast fittings and connections for compliance with manufacturer's recommendations.
14. ☐ Barge or pontoon ballast compartments for proper ballast; deck loads for proper securing; chain lockers, storage, fuel compartments, and battening of hatches; fire fighting and lifesaving equipment in place and functional; hull void compartments sounded for leakage (floating cranes and derricks).

	SAFE WORK PRACTICE	
ERM	SOP #:	17
	Title:	Personnel Platform (Man Basket) and Aerial Work Platform
	Last Rev.:	1/12/2011
	Page:	1 of 3

SCOPE

This procedure provides guidance on the use, testing, loading and safe work practices for the personnel and aerial platforms. It has been developed as a reference document to provide ERM subcontractors.

ERM personnel are not authorized to operate equipment referenced in this Safe Work Practice.

DEFINITIONS

- **Aerial Device** - An "Aerial device" is any vehicle-mounted device, telescoping or articulating, or both, which is used to position personnel.
- **Platform** – A "Platform" is any personnel-carrying device (basket or bucket) which is a component of an aerial device.

PROCEDURE

A. USE

Personnel platforms should only be used when the erection, use and dismantling of conventional means such as a ladder, stairway, , elevated work platform or scaffold, would be hazardous, or is not feasible because of structural design or work site conditions. Only trained persons shall operate personnel and aerial platforms.

B. TESTING

Trial lift, inspection and proof testing.

1. A trial lift with unoccupied personnel platform loaded at least to the anticipated lift weight shall be made from ground level.
2. Daily trial lift shall be performed immediately prior to placing personnel on the platform.
3. The lift operator shall determine daily that all systems, controls and safety devices are activated and functioning properly.
4. The operator is to remain under the 50 percent limit of the hoist's rated capacity.
5. The primary attachment shall be centered over the platform.

C. PERSONNEL PLATFORM

1. Must support its' own weight and five times the maximum intended load.

2. Handrail must comply with Subpart M of the OSHA standard.
3. The platform shall be enclosed from the toeboard to the mid-rail
4. A grab rail must be installed inside the entire perimeter of the platform.
5. Swing out gate access face shall be equipped with a restraining device to prevent accidental opening.
6. Overhead protection is necessary when employees are exposed to falling objects.
7. The platform must be posted or permanently marked indicating weight of platform and maximum rated load capacity.

D. WORK PRACTICES

1. All body parts are to be kept inside the platform during the raising and lowering of the Personnel Platform.
2. Before employees enter or exit a hoisted personnel platform, the platform shall be secured to the structure unless this creates an unsafe condition.
3. Employees occupying the personnel platform shall use a body harness system capable of supporting a fall impact for employees using the anchorages. Employees working over or near water shall comply with OSHA standard 1926.106.
4. The personnel platform shall not be used as a material hoist.

E. PRE-LIFT MEETING

1. A pre-lift meeting attended by the lift operator and his foreman, signal person, and employees to be lifted and their foreman shall be held to review the appropriate provisions of the procedure.

NOTE: Refer to OSHA standard 1926.550 cranes and derricks for additional information.

REFERENCES

Regulatory References

- 29 CFR 1910.67 Vehicle-mounted Elevating and Rotating Work Platforms.
- 29 CFR 1926.552 Material Hoists, Personnel Hoists, and Elevators. Standard.
- 29 CFR 1926.550 Cranes and Derricks.
- 29 CFR 1926.106 Working over or near water

Technical References

None

Procedural References

None

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM, clarified ERM position on employees operating powered personnel platforms and aerial work platforms

	SAFE WORK PRACTICE	
ERM	SOP #:	19
	Title:	Lockout/Tagout
	Last Rev.:	1/12/2011
	Page:	1 of 3

SCOPE

This procedure provides guidance on the control hazardous of energy to prevent injury to employees due to unexpected start-up or release of stored energy.

DEFINITIONS

- **Affected Employee**

  Any employee whose job requires them to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout/tagout or whose job requires them to work in an area in which such servicing or maintenance is being performed.

- **Authorized Employee**

  Any employee who locks out or initiates a tagout procedure on machines or equipment in order to perform servicing or maintenance on that machine or equipment. An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance covered under this procedure.

- **Circuit Breaker**

  Switch (housed in a distribution panel) controlling the flow of electricity (on/off) to the electrical equipment.

- **Control Switch**

  The switch controlling the flow or electricity between the disconnect switch source and the electrical equipment. Also called:

  a. Start-Stop button.
  b. Butterfly switch.
  c. Control station.

- **Disconnect Switch**

  Switch (normally housed in an electrical control room) controlling the flow of electricity (on/off) to the equipment and its control switch. This switch is also called:

  a. Combination starter switch.
  b. Switch and starter.

- **Zero Mechanical or Energy State**

  That state of a machine in which every power source that can produce machine member movement has been locked out. This includes blocking, controlling or isolation of electric, kinetic or potential energy sources

- **Multi-Lockout Devices**

  A multi-lockout hasp mechanism which can be used so more than one lock can be attached during a lockout. Lock boxes are another alternative for using multiple locks.

- **Personal Lock**

  A safety lock used by authorized personnel that is durable and capable of withstanding excessive force. Any authorized employee uses it to lock out equipment. All locks will be on a "One Lock, One Key, One Employee" system.

- **Tags**

  A standard tag signed and dated shall be attached to the individual's lock. The tag shall be attached by passing the grommet through the lock shackle. The legend on the tag shall read, "DANGER, DO NOT OPERATE". Tags shall be capable of withstanding the environment to which they are exposed for a maximum period of time that exposure is expected.

PROCEDURE

1. The Project/Construction Manager shall inform the affected party responsible for the machinery or equipment being repaired or serviced that the equipment needs to be shut down so it can be locked out, tagged out and tried (electrical only).
2. The authorized party shall be responsible for the de-energizing switches, circuit breakers, pneumatic valves, or hydraulic valves, which control the operations of machinery or equipment that contains or ever contained hazardous energy.
3. Prior to the start of any work, all machines and equipment must be brought to a "zero mechanical/energy state. The Authorized Employee conducting the lockout should attempt to activate ("Try") the equipment with the starting device, to verify the equipment does not show any sign of stored energy.
4. Each authorized employee shall remove their personal lock and tag when they have completed their job and are no longer required to perform any other task on the equipment.
5. When work continues beyond the shift, an individual's lock and tag may remain in place if the Site allows. However, when returning to continue the work, each individual shall check their own lock and tag prior to starting work. Each individual must re-date their tag daily through out the duration of the job. The re-dating will confirm that the individual checked their personal lock, assuring the equipment remains locked out.
6. Shift change and new crews coming in requires the change-out of locks and tags.

A. GROUP LOCKOUT

1. When it is impractical because of the magnitude or complexity of large jobs such as major facility shutdown or overhaul, group lockout can be utilized.

    a. The Project/Construction Manager shall be responsible for arranging the shutdown for energized equipment to be locked and tagged out.
    b. The Subject Matter Expert shall apply locks and tags to all disconnect switches to be worked on.
    c. The keys shall be placed in a group lockbox or comparable mechanism. It shall have a hasp and keeper, which will permit application of a "Lockout Device" so it can accommodate more than one lock.
    d. Each authorized employee shall affix their personal locks and tag with their name and date to the "Lockout Device" on the "Group Lockbox".
    e. Each authorized employee is to test by "Trying" the control switch to assure the equipment has been electrically de-energized before starting work.

REFERENCES

Regulatory References

- 29 CFR 1910.147 The Control of Hazardous Energy (Lockout/Tagout).

Technical References

None

Procedural References

None

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM

	SAFE WORK PRACTICE	
ERM	SOP #:	20
	Title:	Wall and Floor Penetrations
	Last Rev.:	1/12/2011
	Page:	1 of 2

SCOPE

This procedure provides guidance on the minimum safety requirements for wall / floor penetrations. Potential hazards that may exist when wall / floor openings are made (in addition to fall hazards) include but are not limited to, concealed pipes, existing electrical wiring, telephone lines and fire alarms.

PROCEDURE

Prior to cutting into walls/floors, visually survey the area of penetration to see if there are any pipes or electrical services that my present an obstacle. If blueprints are available, the Subcontractor should review the prints to determine if any services are present that may be hidden in the wall/floor. Hidden hazards should be expected. Services may be supplied from adjacent floors, rooms or concealed in floors.

Prior to cutting / penetrating walls / floors:

1. Determine if the wall is bearing or nonbearing.
2. For interior walls, remove the ceiling tiles to help determine what services may be hidden in the wall.
3. Cutting both faces of the wall at the same time is prohibited.
4. Barricade both sides of the wall or floor.
5. When it has been determined that utilities are in the wall or floor, and may present a hazard / interference, SWP 19 "Lockout/Tagout Procedure" must be implemented.
6. All floor or wall openings must comply with OSHA 29 CFR 1910.23 "Guarding Floor and Wall Openings and Holes".
7. Before any power saws are used on masonry walls or floors, a visual inspection of both sides of the surface must be made for all utilities.
8. On hollow core walls, exploratory openings shall be made prior to creating an enlarged opening utilizing power tools.
9. The Subsurface Clearance Process must be followed for poured floors requiring core boring.

REFERENCES

Regulatory References

- 29 CFR 1910.23 Guarding Floor and Wall Openings.

Technical References

None

Procedural References

ERM Subsurface Clearance Procedures

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM

SCOPE

This procedure provides guidance to ERM employees on the minimum safety requirements for work in areas where ionizing radiation is an employee exposure concern as a known or suspected hazard, as required by Title 29 of the *Code of Federal Regulations* (CFR), Part 1910.96, "Ionizing Radiation," and the requirements of 10 CFR, Part 20, "Standards for Protection Against Radiation" (applicable to environmental consultants). It does not address hazards for non-ionizing forms of radiation such as infrared, ultraviolet, microwave, radio waves, and so on. Health and safety plans (HASP) for work sites with known or suspected ionizing radiation shall include this SWP or the associated Job Hazard Analysis (JHA) as an attachment. General guidelines, exposure limits, and procedures are discussed below.

1.0 GENERAL GUIDELINES

ERM intends to keep all employee radiation exposure levels as low as reasonably achievable (ALARA). Field workers should use a combination of engineering controls, administrative controls, and personal protective equipment (PPE) to limit external and internal radiation doses. Basic protection control measures that apply to all forms of radiation include (1) reducing exposure time, (2) increasing distance from the radiation source, and (3) using a shield between the radiation source and employees. Additional guidelines are listed below.

- Personnel will be protected from internal and external radiation exposure hazards through general and site-specific training, use of PPE, adherence to strict work practices, and proper decontamination procedures.
- Ingestion of contaminated material will be prevented through good personal hygiene. Eating, drinking, and smoking are not permitted in potentially contaminated areas. Washing hands when leaving a contaminated area and before eating is required.
- Employees with open cuts or abrasions are not allowed to handle contaminated material because handling may allow entry of the material into the bloodstream.
- Pregnant employees will be advised not to work in areas with known or suspected radiation hazards. However, if a pregnant woman wants to work, limits on declared pregnant workers defined in 10 CFR, Part 20 apply.

The field safety officer (FSO) is responsible for ensuring that personnel are appropriately monitored for exposure to ionizing radiation. A radiation safety officer (RSO) may be assigned to a site to assist the FSO as conditions dictate.

2.0 EXPOSURE LIMITS

Ionizing radiation presents a hazard as both a source of external exposure and as a contaminant of surfaces and media. Radiation exposure limits as established by the Nuclear Regulatory Commission (NRC) are presented below.

Type of Exposure	Annual Limit
Whole body (head and trunk), active blood-forming organs, or gonads	5 roentgen equivalent in man (rem) per year, total effective dose
Lens of the eye	15 rem per year
Extremities	50 rem per year
Skin of the whole body	50 rem per year

In addition to the whole-body doses listed above, the NRC has also established derived air concentrations (DAC) for airborne radioactive materials (RAM) exposures. Table 1 of Appendix B, 10 CFR, Part 20, lists DACs for RAMs. The DAC values are designed to maintain internal exposure doses below the annual limit for intake (ALI), assuming a 40-hour per week exposure period. Total body dose calculations must factor in the contribution of airborne RAM to the total dose. The table in 10 CFR, Part 20, should be consulted when calculating internal exposures through inhalation of specific radionuclides.

3.0 PROCEDURES

The following sections discuss procedures related to personal monitoring, environmental monitoring, restricted areas, training, PPE, decontamination, and exposure and medical records associated with work at sites involving potential exposure to radiation.

3.1 PERSONAL MONITORING

Each individual working at a site with the potential for radiation exposure will participate in a monitoring program designed to measure worker external and internal radiation doses. The instrument and devices used for this monitoring as well as monitoring procedures and protocol are discussed below.

3.1.1 External Radiation Dosimetry

In most cases, external radiation exposure will be measured by thermoluminescent dosimeters (TLD), film badges, or pocket dosimeters. The determination of the appropriate dosimeter for a specific project will be made based on site history and potential risk for exposure to external ionizing radiation. Specific badge handling procedures will be provided on a case-by-case basis.

TLDs that measure x-ray, beta, and gamma radiation are general use dosimeters that measure external ionizing radiation levels to which personnel are exposed. They are analyzed after each calendar quarter to comply with Occupational Safety and Health Administration (OSHA) and NRC requirements. ERM shall provide TLDs to field workers who routinely work in areas with potential radiation hazards. If TLDs are needed for long-term projects lasting more than 5 months, the division health and safety leader or NAHSD will provide additional guidance to ERM employees.

Employees scheduled for short-term field work where potential radiation hazards exist should use pocket dosimeters. Pocket dosimeters should be used for field work lasting 1 to 2 days. Pocket dosimeters can be used along with TLDs to provide real-time exposure monitoring. Employees using a pocket dosimeter in areas exceeding the applicable radiation exposure action levels must record the radiation dose daily in a field logbook. A copy of recorded exposures above background levels must be submitted to the safety team within 15 calendar days of field work completion. If the pocket dosimeter indicates that an individual has received a radiation dose of 100 millirems or more, the individual will be removed from field work and his or her TLD will be processed immediately. Pocket dosimeters must be requested through the ERM safety team.

In the event of a lost or damaged TLD, the site FSO and/or RSO will determine a dose estimate for the individual by using values recorded on direct-reading instruments. If such a dose cannot be determined, the maximum permissible radiation dose for the time period in question for the affected employee will be recorded in the field logbook.

3.1.2 Airborne Radioactive Material Measurement

Airborne RAM may enter the body during inhalation resulting in an internal radiation dose. NRC regulations require the measurement of airborne RAM concentrations whenever inhalation exposures may result in an intake in excess of 10 percent of the ALI for that RAM as defined in Appendix B, Table 1, of 10 CFR, Part 20. In accordance with principles of ALARA, ERM shall require monitoring of airborne RAM under all circumstances of potential exposure.

Airborne RAM may be emitted by processes involving RAM or from radioactive contamination in dirt, debris, and on surfaces that have been disturbed. Monitoring shall be conducted using air sampling devices appropriate for personal monitoring and shall account for all potential periods of exposure. Samples shall be submitted to an accredited laboratory for analysis as soon as possible.

3.2 ENVIRONMENTAL MONITORING

The types of radiation sources, RAM, and types and extent of impacts to the site (such as superrficial contamination), will determine which survey instruments are necessary to characterize the site. Both area radiation levels and surface contamination levels will be monitored. Survey instruments will be specified in the HASP. ERM can obtain the necessary radiation survey instruments for area monitoring through equipment vendors.

If used on field projects, ERM personnel will monitor site conditions with direct-reading instruments when site information is sufficient to show that the potential for ionizing radiation exposure exists or when specific site information is not sufficient to eliminate the possibility of radiation sources or contamination. The initial site evaluation will include a review of available site data, including site history.

Upon startup of field activities, regular monitoring will be conducted if necessary to track the locations and intensities of RAM. Monitoring of airborne RAM within work areas and at the site's downwind perimeters is also required.

Results of radiation and contamination surveys shall be documented in the field logbook and the logbook shall remain on site for the duration of site activities. As work progresses at the site, survey and contamination maps shall be updated accordingly.

3.3 RESTRICTED AREAS

Restricted areas are designated to control personnel exposures to RAM and to prevent the spread of contamination out of the area. The posting of warning signs around restricted areas shall follow the requirements of 10 CFR, Part 20, Subpart J. Restricted areas shall be designated in the HASP as the exclusion zone or a portion of the exclusion zone.

3.4 TRAINING

Specific training requirements for work assignments involving potential exposure to RAM or radioactive contamination should be included in the site-specific HASP. Training requirements are not specified in 10 CFR, Part 20. However, ERM will require employees working with or

potentially exposed to RAM to receive specific training on RAM and the hazards associated with the specific site. General RAM training will include the following topics:

- Types and properties of ionizing radiation
- Acute and long-term health effects of exposure to ionizing radiation
- Exposure routes
- PPE for RAM
- Administrative and engineering exposure controls
- Personal, area, and contamination monitoring devices and their uses
- Basic requirements of 10 CFR, Parts 19 and 20

Site-specific training will address the following topics:

- Types of RAM and ionizing radiation at the site
- Locations of RAM at the site
- Designated restricted and contaminated areas
- Decontamination methods
- Personal, area, and contamination monitoring devices designated for the site
- Emergency procedures for RAM incidents

3.5 PERSONAL PROTECTIVE EQUIPMENT

A minimum of full Level C protection with disposable coveralls must be worn in any potentially radiation-contaminated area. ERM personnel will use air purifying respirators with high-efficiency particulate air (P100) cartridges to prevent inhalation of airborne alpha particles and radionuclides. This level of protection will prevent or minimize radioactive material from contacting skin. PPE must be thoroughly decontaminated with extreme care to prevent the spread of contamination to other areas. Contaminated material on the skin must be removed as quickly as possible. Supplied air respirators can also be used depending on the hazard and work activity.

3.6 DECONTAMINATION

Generally, decontamination procedures for RAM are the same as for hazardous waste; however employees should take the following additional precautions:

- Know where contamination is and avoid tracking equipment and personnel through it
- Use proper decontamination techniques
- Use straight detergent, soap and water, or commercially prepared solutions to remove RAM (solutions containing ethylenediamine tetraacetic acid, such as Radiacwash®, will bind up RAM and maintain the RAM in solution before rinsing)
- Consider all decontamination materials to be contaminated; decontamination waste will contain RAM and must be disposed of properly

3.7 EXPOSURE AND MEDICAL RECORDS

ERM shall maintain records of radiation exposure of all employees for whom personnel monitoring was conducted. Records will be evaluated to verify that exposures are maintained at ALARA levels. ERM is obligated to evaluate ionizing radiation exposure data to verify that exposures are maintained at ALARA levels and will provide a yearly summary exposure report to each participating employee. If quarterly results indicate high exposure, the employee will be notified immediately. Retained radiation exposure records will indicate exposure in millirems per calendar quarter, DAC hours of airborne radiation exposure, and the calculated combined dose for the total body (summary of the external and internal doses) using methods for calculating total body dose presented in 10 CFR, Part 20.1202.

Special medical examinations may be necessary when excessive external or internal doses of radioactive materials are suspected to have occurred. Medical evaluation needs will be established on a case-by-case basis with the advice of the ERM consulting physician. Any instance of suspected overexposure should be reported immediately to the FSO. The FSO will contact the appropriate safety team personnel for recommendations on how to proceed with follow-up medical evaluations.

ERM shall maintain exposure records for former employees along with their medical records in accordance with applicable regulations. These records will be available to former employees within 30 days of receipt of a written request for them.

	SAFE WORK PRACTICE	
	SOP #:	22
	Title:	Safe Use of Portable and Dedicated Electrical Submersible Pump Systems to Mitigate Hazard of Electrical Shock
	Last Rev.:	5/24/2011
	Page:	1 of 3

SCOPE

This procedure defines minimum expectations for the safe use of portable and dedicated electrical submersible pump systems, including tools and equipment to be used by employees.

DEFINITIONS

AC Voltage Detector: sensor used to detect the presence of electricity. The closer it comes to live electrical lines, the louder the signal becomes.

Pump System: comprised of all equipment and materials required to purge/sample groundwater from within a constructed groundwater well.

1. Submersible Pump
2. Control Box
3. Electrical Cables

PROCEDURE

A. VISUAL INSPECTION

1. Inspect all electrical pump system wires, insulation, and plugs. For dedicated pumps that cannot be removed from the well for inspection without use of a drilling rig, inspect all at-grade system components. Establish a schedule for regular removal and inspection/maintenance of dedicated pump systems.
2. Maintain sampling equipment in good condition – dry, clean, rust-free, etc.
3. Ensure power source has a built-in ground fault circuit interrupter (GFCI).
4. Ensure well head is properly fastened to well casing and is crack free.

B. ELECTRICAL POWER SUPPLY

1. Properly attach all power components (i.e., plugs, control boxes, etc.)
2. Conduct a second thorough visual inspection to confirm the sample network is properly setup.
    i. Confirm that pump control box switch is in **OFF** position.
    ii. Ensure that all plugs are properly connected.
3. Do not touch any part of the wellhead. Turn on power supply.
4. Turn on pump control box.
5. Use AC voltage detector to confirm that all external parts of the pump system (i.e., sample port, sample riser, well head, tubing, etc.) are not electrically charged.

C. OPERATING PRACTICES

1. Inspect sample equipment before start-up at each well location. Look for loose or damaged parts and inadequate jacketing/insulation.
2. Examine each piece of equipment before using it. Look for damaged parts, loose fittings, frayed or cut electric cords. Tag and return defective tools for repairs.
3. Shut off power and use formal lockout-tagout (LO/TO) program to make any repairs, perform maintenance, or adjust moving parts. Only qualified employees who have been authorized by ERM and trained by ERM in LO/TO procedures can perform this work.
4. Never touch a powered/live part unless power source is disconnected (such as control box, electical converter, sample riser, etc.) Note that some pump control boxes have an embedded capacitor which remains charged for a period of time after the power is disconnected. Often, a visual indicator, such as an LED light, will extinguish once the unit is fully de-energized. Do not touch a powered/live part until this LED light fully extinguishes.
5. The use of insulated rubber electrical gloves when handling external parts of the pump system while system is powered is recommended.
6. GFCI**s** are required when using an industrial generator as the power supply. The use of a safety switch is not required in low-voltage scenarios (i.e., 12 volts).
7. Do not sample well if pump system is faulty and none of the above mentioned safety measures can be applied.

D. TRAINING REQUIREMENTS

1. Field personnel are familiar with and trained on the proper use of
    i. Sampling equipment (i.e., submersible pump, control box, generator, etc.)
    ii. AC Voltage Detector
2. ERM personnel may not perform LO/TO unless they have been authorized by ERM to do so, including attending ERM LO/TO training.

REFERENCES

Regulatory References

None

Technical References

Grundfos, 2006. *SQ, SQE Installation and Operating Instructions*. May.

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
5/3/2011	0		
5/23/11	1		Incorporated comments from ERM internal review team

North America Job Hazard Analysis
Operating Vehicles

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 3	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Operating vehicles for work, including personal vehicles, company-owned non-commercial small trucks, and rental vehicles.

Hazard Analysis:

Task Step	Hazard	Control Measures
Inspect the Vehicle	Tire pressure, brakes, steering, headlights and other vehicle equipment malfunction can contribute to vehicle accidents and property damage. Loose articles inside the vehicle and carried in truck beds or on trailers can shift and cause distractions or traffic accidents.	Use the "ERM Vehicle Safety Form" to document daily inspections of the vehicle. In certain cases, a client-required form may be used instead. Do not operate any vehicle if its safety is in question. During vehicle inspection make sure any loose articles either inside the vehicle or in truck beds/on trailers are well-secured.
Get in and out of the Vehicle	Hands, hair, or loose clothing can be caught in doors, trunk covers, and other vehicle equipment, causing injury.	When entering or exiting a vehicle, pay attention to what you are doing. ERM has had incidents occur simply from being rushed and not paying attention during vehicle entry/exit.

North America Job Hazard Analysis
Operating Vehicles

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 3	

Task Step	Hazard	Control Measures
Drive the Vehicle	Operating a vehicle presents many different hazards to employees that must be simultaneously mitigated.	Only allow ERM employees to drive motor vehicles (authorized employees with a current drivers license). Before moving vehicles always put your seat belt on, and stop using handheld electronics. Make sure any food or drink is secured and any electronics are programmed (GPS). When moving vehicles, follow all posted speed limits and posted signs. Do not pick up hitch-hikers, and never transport people in truck beds.
Driving when Fatigued	Operating a vehicle after a full day of work or when you are fatigued drastically decreases focus and response time, and increasing the risk of being involved in a vehicle accident.	Avoid driving more than 8 hours in one workday. If the number of hours driving to/from a jobsite combined with the number of hours to be worked on the site will equal more than 14 total hours, alternate arrangements should be arranged. Be aware of your fatigue level while driving and stop to rest if you feel overly tired.
Stay Focused on the Road	Doing anything that distracts you from the road for more than 2 seconds highly increases the risk of being involved in a vehicle accident. In particular, driver inattention due to hand-held mobile phone use is currently thought to be responsible for approximately 80% of all vehicle accidents.	Do not operate a hand-held mobile phone while driving. Use a hands-free mobile solution instead, such as a Bluetooth headset or hardwired earpiece. In some cases, all mobile phone use while driving (including answering and dialing), may be prohibited by our client. Do not perform activities while driving that will take your attention off the road for more than 2 seconds. A few of these types of activities could include programming GPS', applying makeup, changing the radio, or eating while driving. When these sorts of activities must be performed, pull to the side of the road and stop.

North America Job Hazard Analysis
Operating Vehicles

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 3	

Task Step	Hazard	Control Measures
Pull a Trailer	Many drivers are unfamiliar or inexperienced with pulling trailers, increasing the risk of being involved in a vehicle accident.	If you are uncomfortable pulling a trailer do not do so. Arrange for an alternate, experienced driver. Be aware that it takes longer to speed up and slow down when pulling a trailer, and that visibility may be reduced significantly. Make sure your vehicle is capable to pull the weight of the trailer and its contents. Inspect the trailer to ensure brake and turn signals work properly and in concert with the main vehicles signals, and that tire pressure is acceptable. Make sure trailer is attached securely to the main vehicle and the safety chain or other backup attachment device is in-place. Evenly distribute weight on any trailers pulled.
Leaving the Vehicle	Leaving personal valuables and company equipment/documents in abandoned vehicles may attract thieves.	Turn off the engine and lock any vehicle being left for even a short period of time when not on a secure jobsite. If the vehicle will be left for long periods or overnight, remove any company documents, computers, and equipment, personal valuables, or any items that would attract thieves.
Report and Document Vehicle Accidents and Property Damage	Improper documentation of vehicle accidents and property damage caused by vehicle operation place ERM at risk.	No matter how minor a vehicle accident or property damage event is, report it as a safety event. If involved in a vehicle accident, always call the police so a report will be available, to protect your liability, and to protect ERM liability. Take as many pictures as you can of the accident scene if you can do so without placing yourself in further danger.

North America Job Hazard Analysis
Operating Vehicles

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 3	

Task Step	Hazard	Control Measures
Drive a Commercial Vehicle	Driving vehicles alone or in combination (with a trailer, for example) with Gross Motor Vehicle Weight (GMVW) greater than 10,000 pounds carries additional regulatory requirements. Not addressing these requirements places ERM at risk.	Check the plaque on the inside of the driver-side door for the GMVW. If the weight is greater than 10,000 pounds contact a member of the North America Safety Team for further assistance. Do not operate the vehicle unless you have received proper training and have required supplies (such as logbooks).
Rent a Vehicle	Only certain car rental agencies have negotiated contracts, rates, and insurance coverage with ERM. Renting a vehicle from another agency exposes you and ERM to unnecessary liability and risk.	If possible, rent vehicles using the Cain Travel website, and from an ERM authorized car rental agency. If not possible to rent from one of these, you must purchase collision damage and personal accident insurance at the time of rental. Currently, authorized rental car agencies include: • Enterprise Car Rental • Hertz Car Rental

Personal Protective Equipment Required for this Task:

Type	Description
Vehicle Safety Kit for Personal or Company-Owned Vehicles	Includes small fire extinguisher (ABC), first aid kit, spare tire/jack, jumper cables, flashlight, flares or lighted triangles, reflective vest, and disposable or digital camera (for documenting accidents)

Training Required for this Task:

Type	Description
ERM Safe Driving	E-learning course instructing employees on ERM vehicle safety policy and practice.

Forms Associated with this Task:

Type	Description
ERM Vehicle Safety Form	Includes items that should be inspected regularly on motorized vehicles.

North America Job Hazard Analysis
Work in Active Facilities

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.:4	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

General guidelines for working safely in facilities where active operations are occurring and other personnel are performing work

Hazard Analysis:

Task Step	Hazard	Control Measures
Plan ahead for the site visit	Operational and safety items unplanned for prior to visiting the site can cause significant delay	Know ahead of time where any specific parking and entry locations are, as well as training or drug testing required prior to site entry. Ask your site contact/escort to explain any pre-entry requirements. Have the following personal protective equipment with you and wear it while working: • Steel-toe boots • Long pants • Safety glasses • Hard hat • Safety goggles (if splash hazards exist) • Chemical resistant gloves (if needed)

North America Job Hazard Analysis
Work in Active Facilities

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.:4	

Task Step	Hazard	Control Measures
Perform Site Work	Employees may encounter moving vehicles/trucks/forklifts.	Be aware of traffic patterns on the site, including designated forklift lanes.
	Employees may be exposed to chemicals.	Include chemicals known to pose health risks in your WARN HASP for the site, and determine their exposure limits.
	There may be uneven terrain, unguarded holes or wall openings, and other slip, trip, and fall hazards.	For any fieldwork, wear steel-toe boots with enough ankle support. If an area is overly cluttered, poorly lit, or posted signs indicate these hazards, avoid the area if possible.
	A site emergency may happen while you are working onsite.	List the facility emergency planning information in the WARN HASP and have a copy of it with you at all times. Stay with your site escort at all times.
	You may encounter confined spaces.	If you encounter posted signs stating "DANGER – Confined Space – Do Not Enter", do not enter the space. Be alert to other areas where entry or exit appears to be limited.
	High noise levels may be present.	If a noise dosimeter is not available, use the following rule of thumb. If you are standing close to another person and have to raise your voice to be understood by them, hearing protection is needed.
	Highly mechanized equipment may be present in the area, posing electrical hazards and pinch hazards.	Do not touch plant equipment unless you verify it is not powered and permission has been given to you.

North America Job Hazard Analysis
Work in Active Facilities

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.:4	

Task Step	Hazard	Control Measures
Working Alone	Any injury or illness that occurs to an employee working alone can become very serious if they are not able to reach another person for assistance.	If a Level 2 or 3 WARN HASP has been prepared, do not work alone. If working alone is authorized, establish a communication plan in your WARN HASP and follow it completely. Also stay in close communication with your site contact/escort. If you become ill or injured when working alone, immediately call 911 for serious emergencies, or WorkCare's Incident Intervention service for other types of illnesses or injuries. The WorkCare Incident Intervention phone number is 1-800-II-XPRTS. Know the contact information and route to the nearest medical facility.

Personal Protective Equipment Required for this Task:

Type	Description
None	

Training Required for this Task:

Type	Description
None	

Forms Associated with this Task:

Type	Description
Work in Active Facilities Checklist	Checklist covering items associated with working in active facilities. The checklist may be used to perform pre-job risk assessment.
WorkCare Incident Intervention Wallet Card	Wallet-sized card to be carried by all ERM employees containing contact information for the Incident Intervention service.

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.:4	

WorkCare Incident Intervention Wall Poster	11″ x 17″ poster containing contact information for the Incident Intervention service. This poster should be displayed in each permanent office location and in short-term field office locations.

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
ERM Actions During Subsurface Clearance and Drilling

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 6	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

General guidelines for working safely when performing any ground penetrating activities (excluding surface soil sampling) and ERM personnel activities during overseeing drilling.

Hazard Analysis:

Task Step	Hazard	Control Measures
Identify a Client Contact Person	Client contacts that are not familiar with the site layout could cause critical information to be missed during safety planning.	Determine degree of knowledge of our client contact by evaluating their current job duties at the site, length of time they have worked at the site, and time in their current job. If the ERM team does not feel comfortable with the level of experience of our client contact, take additional measures to ensure all pertinent subsurface utilities and services information is gathered.
Engage Subcontractors	Subcontractors who have not been evaluated against ERM minimum safety standards or who do not meet minimum safety standards may pose more risk.	Use only ERM subcontractors who are identified as having met our minimum safety standards. In cases where using an already-qualified subcontractor is not possible, ensure extra precautions are taken to provide safety oversight to the work.
Appoint an ERM Subsurface Clearance "Experienced Person" to the project	ERM employees who are not experienced with SSC issues may not recognize critical zones or clues to other site utilities/services.	Ensure a "SSC Experienced Person" is assigned to the project to provide oversight of ground penetrations and to mentor less experienced ERM employees.

North America Job Hazard Analysis
ERM Actions During Subsurface Clearance and Drilling

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 6	

Task Step	Hazard	Control Measures
Gather site-specific subsurface information	Incomplete or inaccurate site utility/service drawings may lead the ERM project team to incorrect conclusions regarding what utilities/services are onsite.	Obtain the most recent "as-built" drawings and additional site information such as easements, rights-of-way, historical plot plans, etc. to assist making decisions about other actions that will be required at the site.
Develop the HASP	Using incorrect documents in safety planning may lead to not considering all pertinent information.	A Level 2 WARN HASP for Intrusive Work (minimum) must be used when performing any ground penetrations, with the exception of surface soil sampling. The Level 2 HASP contains a "Site Services Model" that ERM uses to evaluate SSC hazards.
Develop the Site Services Model	Critical zones and a whole-site view of utilities and services at the site are more difficult to do if not put into the Site Services Model.	Use the Site Services Model to identify gaps in knowledge from all drawings and other verbal information from our client contact. Identify locations of key isolation and shutoffs closest to the work area for each type of utility/service.
Make Preliminary Determinations	Not recognizing or identifying critical zones poses great hazard to ERM employees in the field from contact with electricity or other utilities.	Establish critical zones and excavation buffers (if needed) for the work. Initial critical zone determinations may change in the field but are a good starting point in hazard identification.
Identify Preliminary Ground Disturbance Locations	Planning ground disturbance locations inside critical zones poses great hazard to ERM employees in the field from contact with electricity or other utilities.	Ensure critical zones have been identified using the Site Services Model and then identify locations outside those critical zones up-front, if possible. If a ground disturbance inside a critical zone is absolutely necessary, notify the site PIC and obtain guidance from him/her before proceeding.
Public and/or Private Utility Markout	Not having utilities marked may lead to a subsurface clearance strike.	Contact public and private utility markout services giving them enough time to respond. A minimum of 24-hour notification to utility locators is required in most states, and may vary higher in some states.
Conduct the Site Walk	Inexperienced people conducting the site walk may miss pertinent information regarding utilities and/or services.	The "SSC Experienced Person" must lead the site walk and should be accompanied by our client contact. Each ground disturbance location should be approved by our client contact (written approval preferred, verbal approval acceptable).

North America Job Hazard Analysis
ERM Actions During Subsurface Clearance and Drilling

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 6	

Task Step	Hazard	Control Measures
Inspect Each Ground Disturbance Location	Inexperienced people conducting inspection may miss pertinent information regarding utilities and/or services.	The "SSC Experienced Person" must lead inspection of each Ground Disturbance Location. Any visual clues of subsurface obstruction/utilities should be documented. Critical zones may have to be reassessed at this point. Use the SSC Checklist to document this inspection for each point inside a critical zone, at a minimum.
Finalize Critical Zone Determinations	Not performing this verification step in the field may lead to a SSC strike.	Use information gathered during pre-planning, utility markout, and site walk/inspection to verify critical zones that have been previously established. Revise critical zones as necessary. Use the SSC Checklist to document points inside critical zones. If points are confirmed inside critical zones, either step out and relocate the ground disturbance location, or contact the PIC for additional guidance.
Oversee setup of drilling equipment	Overhead electrical/other lines may come in contact with drill rigs. Materials stored in the vicinity of drill rigs may pose various hazards to employees.	Ensure drill rigs are set up in areas where they will not contact overhead lines when being positioned. The minimum distance for drill rig clearance is 25 feet unless special permission is granted by the utility company. When a drill rig must be maneuvered in tight quarters, the presence of a second person is required to ensure adequate clearance. If backing-up is required, two ground guides will be used: one in the direction the rig is moving and the other in the operator's normal field of vision. Move tools, materials, cords, hoses, and debris to prevent trip hazards and contact with moving drill rig parts. Secure tools and equipment subject to displacement or falling. Store any flammable materials away from ignition sources and in approved containers.

North America Job Hazard Analysis
ERM Actions During Subsurface Clearance and Drilling

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 6	

Task Step	Hazard	Control Measures
Physically Clear all Ground Disturbance Locations	Employees performing physical clearance could contact underground utility/service lines.	Use cable avoidance tools at each location that must be physically cleared (OSHA requirement). If using a hand-auger, ensure insulated handles are in-place before their use.
	Drill rig could damage electrical/utility/service lines if not physically cleared first.	Mechanical ground penetration should not commence until a ground disturbance location is physically cleared. In certain situations drilling may occur without physical clearance – consult with the project PIC prior to making this determination.
Commence Drilling Operations	Rotating equipment could pull employees into equipment.	Do not wear loose or frayed clothing, loose long hair, or loose jewelry while working around rotating equipment. Tuck shirt-tails into pants. Never walk directly behind or beside drill rigs without the drill rig operator's knowledge. Keep all non-essential personnel out of the drill rig work area.
	Poorly functioning drill-rig equipment could expose employees to hazardous conditions.	Ensure drill rigs and other machinery used is inspected daily by competent, qualified individuals. Instruct drill rig operators to report any abnormalities such as equipment failure, oozing liquids or unusual odors so they can be dealt with before proceeding with work. Do not eat, drink, or smoke near the drill rig.
	Noisy environments may make it difficult to communicate by vocal means.	Wear hearing protection at all times when in the vicinity of the drill rig, or when you must raise your voice to be heard by co-workers. Maintain visual contact with the drill rig operator at all times and establish hand-signal communications for use when verbal communication is difficult.

North America Job Hazard Analysis
ERM Actions During Subsurface Clearance and Drilling

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 6	

Task Step	Hazard	Control Measures
Complete Drilling Operations	Equipment allowed to remain running poses pinch-point and potential explosion hazards to employees.	Shut down drill rigs before repairing or lubricating parts (except those that must be in motion for lubrication). Shut down mechanical equipment prior to and during fueling operations. When refueling or transferring fuel, containers and equipment must be bonded to prevent the buildup of static electricity.

Personal Protective Equipment Required for this Task:

Type	Description
Insulated hand-augers	Hand-augers fitted with rubber handles, or other non-conductive material.

Training Required for this Task:

Type	Description
SSC Classroom Training	Initial classroom training detailing the ERM subsurface clearance process, tools, and forms.
SSC Experienced Person	At least one must be present on all sites involving SSC. The Experienced Person will both give SSC expertise in project execution and mentor less experienced employees.

Forms Associated with this Task:

Type	Description
SSC Checklist	Checklist detailing the ERM SSC process, and providing tools to ensure critical zones and excavation buffers are properly identified and validated in the field.
SSC Mentorship Card	The SSC Mentorship Card provides Experienced Persons with topics to be covered with less experienced employees on SSC sites, and also documents mentoring of the less experienced employees.
Daily Drill Rig Inspection Form	Form required to be used by ERM subcontractors to document daily inspection of drill rigs. This form should be provided by the drill rig operating company. Completed forms should be kept with the

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 6	

	HASP and filed in project files.

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
ERM Actions During Subsurface Clearance and Excavations

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 7	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

General guidelines for working safely when performing any ground penetrating activities (excluding surface soil sampling) and ERM personnel activities during overseeing excavations.

Hazard Analysis:

Task Step	Hazard	Control Measures
Identify a Client Contact Person	Client contacts that are not familiar with the site layout could cause critical information to be missed during safety planning.	Determine degree of knowledge of our client contact by evaluating their current job duties at the site, length of time they have worked at the site, and time in their current job. If the ERM team does not feel comfortable with the level of experience of our client contact, take additional measures to ensure all pertinent subsurface utilities and services information is gathered.
Engage Subcontractors	Subcontractors who have not been evaluated against ERM minimum safety standards or who do not meet minimum safety standards may pose more risk.	Use only ERM subcontractors who are identified as having met our minimum safety standards. In cases where using an already-qualified subcontractor is not possible, ensure extra precautions are taken to provide safety oversight to the work.
Appoint an ERM Subsurface Clearance "Experienced Person" to the project	ERM employees who are not experienced with SSC issues may not recognize critical zones or clues to other site utilities/services.	Ensure a "SSC Experienced Person" is assigned to the project to provide oversight of ground penetrations and to mentor less experienced ERM employees.

North America Job Hazard Analysis
ERM Actions During Subsurface Clearance and Excavations

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 7	

Task Step	Hazard	Control Measures
Gather site-specific subsurface information	Incomplete or inaccurate site utility/service drawings may lead the ERM project team to incorrect conclusions regarding what utilities/services are onsite.	Obtain the most recent "as-built" drawings and additional site information such as easements, rights-of-way, historical plot plans, etc. to assist making decisions about other actions that will be required at the site.
Develop the HASP	Using incorrect documents in safety planning may lead to not considering all pertinent information.	A Level 2 WARN HASP for Intrusive Work (minimum) must be used when performing any ground penetrations, with the exception of surface soil sampling. The Level 2 HASP contains a "Site Services Model" that ERM uses to evaluate SSC hazards.
Develop the Site Services Model	Critical zones and a whole-site view of utilities and services at the site are more difficult to do if not put into the Site Services Model.	Use the Site Services Model to identify gaps in knowledge from all drawings and other verbal information from our client contact. Identify locations of key isolation and shutoffs closest to the work area for each type of utility/service.
Make Preliminary Determinations	Not recognizing or identifying critical zones poses great hazard to ERM employees in the field from contact with electricity or other utilities.	Establish critical zones and excavation buffers for the work. Initial critical zone determinations may change in the field but are a good starting point in hazard identification.
Identify Preliminary Ground Disturbance Locations	Planning ground disturbance locations inside critical zones poses great hazard to ERM employees in the field from contact with electricity or other utilities.	Ensure excavation buffers have been identified using the Site Services Model and then identify locations outside those critical zones up-front, if possible. If a ground disturbance inside a critical zone is absolutely necessary, notify the site PIC and obtain guidance from him/her before proceeding.
Public and/or Private Utility Markout	Not having utilities marked may lead to a subsurface clearance strike.	Contact public and private utility markout services giving them enough time to respond. A minimum of 24-hour notification to utility locators is required in most states, and may vary higher in some states.
Conduct the Site Walk	Inexperienced people conducting the site walk may miss pertinent information regarding utilities and/or services.	The "SSC Experienced Person" must lead the site walk and should be accompanied by our client contact. Each ground disturbance location should be approved by our client contact (written approval preferred, verbal approval acceptable).

North America Job Hazard Analysis
ERM Actions During Subsurface Clearance and Excavations

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 7	

Task Step	Hazard	Control Measures
Inspect Each Ground Disturbance Location	Inexperienced people conducting inspection may miss pertinent information regarding utilities and/or services.	The "SSC Experienced Person" must lead inspection of each Ground Disturbance Location. Any visual clues of subsurface obstruction/utilities should be documented. Critical zones may have to be reassessed at this point. Use the SSC Checklist to document this inspection for each point inside a critical zone, at a minimum.
Finalize Critical Zone Determinations	Not performing this verification step in the field may lead to a SSC strike.	Use information gathered during pre-planning, utility markout, and site walk/inspection to verify critical zones that have been previously established. Revise critical zones as necessary. Use the SSC Checklist to document points inside critical zones. If points are confirmed inside critical zones, either step out and relocate the ground disturbance location, or contact the PIC for additional guidance.
Establish Excavation Buffers	Mechanical digging near subsurface structures not already designated for removal can expose employees to electrical or other serious hazards.	For at least 2 feet in all directions from an identified subsurface structure, use non-conductive tools and physically remove soil.
Notify Equipment Operators where Excavation Buffers are Located	Mechanical digging near subsurface structures not already designated for removal can expose employees to electrical or other serious hazards.	If physically clearing is performed, use cable avoidance tools at each location that must be physically cleared (OSHA requirement). If using a hand-auger, ensure insulated handles are in-place before their use. DO NOT DIG INSIDE AN EXCAVATION BUFFER WITH MECHANICAL EQUIPMENT.

Personal Protective Equipment Required for this Task:

Type	Description
Insulated hand-augers	Hand-augers fitted with rubber handles, or other non-conductive material.

North America Job Hazard Analysis
ERM Actions During Subsurface Clearance and Excavations

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 7	

Training Required for this Task:

Type	Description
SSC Classroom Training	Initial classroom training detailing the ERM subsurface clearance process, tools, and forms.
SSC Experienced Person	At least one must be present on all sites involving SSC. The Experienced Person will both give SSC expertise in project execution and mentor less experienced employees.

Forms Associated with this Task:

Type	Description
SSC Checklist	Checklist detailing the ERM SSC process, and providing tools to ensure critical zones and excavation buffers are properly identified and validated in the field.
SSC Mentorship Card	The SSC Mentorship Card provides Experienced Persons with topics to be covered with less experienced employees on SSC sites, and also documents mentoring of the less experienced employees.
Daily Excavation Inspection Form	Form required to be used by ERM subcontractors to document daily inspection of excavations. Completed forms should be kept with the HASP and filed in project files.

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Work in High Noise Environments

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 8	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for safe work in any environment with elevated noise levels.

Hazard Analysis:

Task Step	Hazard	Control Measures
Prepare for Work	Not having hearing protection or noise monitoring equipment could expose employees to unknown levels of elevated noise.	For work environments known or suspected to present elevated noise hazards, ensure hearing protection is procured and available at the jobsite. For any employee working on the site who has not attended hearing conservation training within the past year, review this JHA with them and document their training. Determine whether noise monitoring has been done on other projects with similar scopes of work by contacting your Safety Team representative. If work on the project will last 30 days or more, procure a noise dosimeter and perform personnel monitoring at the site to document noise levels.
Conduct the Work	Damage to hearing from sustained elevated noise or intermittent impact noise.	If noise dosimetry is not being conducted at the project, use the following rule of thumb to determine whether hearing protection is required: If you are standing within 3 feet of another person and have to raise your voice to be understood by them when talking, hearing protection must be worn.

North America Job Hazard Analysis
Work in High Noise Environments

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 8	

Task Step	Hazard	Control Measures
Report Dosimetry Monitoring Results	Lack of consolidated noise dosimetry monitoring results can result in other employees on different projects not being aware of typical noise levels.	OSHA allows noise dosimetry monitoring results collected when working with specific equipment to be used on any other project site where the same equipment is in-use. Report dosimetry monitoring results to your Safety Team representative so they can be included in a North America-wide listing of typical noise levels.

Personal Protective Equipment Required for this Task:

Type	Description
Hearing Protection	

Training Required for this Task:

Type	Description
Hearing Conservation	

Forms Associated with this Task:

Type	Description
None	

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Engaging and Managing Subcontractors

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 9	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for managing safety of ERM-hired subcontractors to ensure they work safely and ERM liability is minimized.

Hazard Analysis:

Task Step	Hazard	Control Measures
Choose Subcontractor to Perform Work	Lack of executed contractual documentation may increase ERM liability.	The project PIC and/or PM must ensure a signed, executed contract is in-place prior to subcontractors performing work on the jobsite for ERM.
	Insurance documents collected during the safety prequalification process may not be sufficient to meet specific client contractual requirements.	The project PIC and/or PM must ensure that insurance certificates on-file for subcontractors meet or exceed contractual insurance requirements mandated by ERM clients. If the insurance certificate on-file is out-of-date or does not represent sufficient coverage, the project PIC and/or PM must obtain an updated insurance certificate from the subcontractor prior to the subcontractor performing work on the jobsite for ERM.
	Selecting subcontractors that do not meet ERM minimum safety criteria can result in poor safety performance on ERM projects.	Consult the North America "Subcontractor Information" page and select a subcontractor that meets ERM minimum safety criteria. If selection of an already-prequalified subcontractor is not possible due to business considerations or client wishes, provide enhanced subcontractor oversight on the jobsite.

North America Job Hazard Analysis
Engaging and Managing Subcontractors

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 9	

Task Step	Hazard	Control Measures
Prepare Site HASP Documents	Not informing ERM-hired subcontractors of ERM safety requirements for their work may expose employees to hazardous conditions and cause unnecessary project delays.	The project PIC and/or PM must ensure the subcontractor has received a copy of the ERM HASP and supporting documentation prior to mobilization to the jobsite. The subcontractor must be made aware that their personnel must follow provisions in the ERM HASP at a minimum, but that they may not rely on ERM documents for their employee's health and safety protection.
	Not obtaining authorized subcontractor signatures on ERM HASPs may expose ERM to additional liability.	Prior to any jobsite work proceeding, obtain the signature of an authorized representative for the subcontractor on the ERM HASP. Also, have the subcontractor's authorized representative designate one of their employees, by name, to serve as the jobsite contact for ERM safety concerns. List the jobsite safety contact in the ERM HASP.
	The lack of a specific scope of work for an ERM subcontractor opens the possibility of whether ERM or the subcontractor is responsible for certain aspects of jobsite work.	Specify both the ERM and the subcontractor's scope of work in the ERM HASP document. Ensure that any subcontractor personnel on-site has reviewed and signed the site HASP.
	Any ERM attempt to author safety documents for use during completion of tasks on jobsites by subcontractors may not be sufficient to fully control site safety hazards posed by subcontractor work.	In all cases, require the ERM subcontractor to either develop their own site-specific HASP, or develop Job Hazard Analyses (JHA) for the specific tasks they will perform. Attach these documents to the ERM HASP as appendices.

North America Job Hazard Analysis
Engaging and Managing Subcontractors

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 9	

Task Step	Hazard	Control Measures
Conduct the Work	On jobsites where ERM uses subcontracted services, additional liability arising from the OSHA "Multi-Employer Worksite Rule" may be present.	Ensure subcontractor work is overseen by ERM personnel at all times. Whenever subcontractor personnel are present on a jobsite performing work, an ERM employee should be present and engaged in the work being performed. Always include subcontractor personnel in daily jobsite tailgate safety meetings and have them indicate their presence and understanding of the information presented by signing the ERM form documenting the meeting. ERM personnel at the jobsite should perform regular safety inspections of the site, including subcontractor activities. Any deficiencies noted during inspections should be forwarded to the subcontractor's jobsite safety contact for resolution and report-back to ERM. For imminent danger situations (those that may cause loss of life or limb), the ERM inspector should stop the subcontractor's work and ensure all on site retreat until the imminent danger hazard is abated. Do not supply subcontractor personnel with personal protective equipment (PPE). If PPE must be provided to subcontractors, ERM personnel must inspect the PPE and document the inspection prior to providing it to subcontractor personnel. If ERM is performing air monitoring for the subcontractor, ensure calibration of air monitoring equipment is done before and after each use. At a minimum, air monitoring equipment must be calibrated at least once per day. Document equipment calibration and file with the site HASP.

North America Job Hazard Analysis
Engaging and Managing Subcontractors

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 9	

Task Step	Hazard	Control Measures
After Job Completion, Forward Comments to ERM North America Safety Team	Obtaining services from subcontractors who have met ERM minimum safety criteria but have performed poorly on jobsites poses risk to ERM employees on future jobsites.	Submit any comments about the subcontractor's safety performance while working on the ERM jobsite to the ERM North America Safety Team. These comments will be stored in our database and provided to ERM PICs and/or PMs seeking quality subcontractors for future work.

Personal Protective Equipment Required for this Task:

Type	Description
None	

Training Required for this Task:

Type	Description
None	

Forms Associated with this Task:

Type	Description
Subcontractor Safety Prequalification Checklist	ERM form given to subcontractors that collects information necessary to determine whether the subcontractor meets ERM's minimum safety criteria.
Subcontractor Insurance Certificate	Subcontractor-supplied form issued by the subcontractor's insurance carrier or broker evidencing current insurance coverage.

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Engaging and Managing Subcontractors

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 9	

North America Job Hazard Analysis
Hazard Communication

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 10	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for communicating hazards posed by the storage and/or use of chemicals.

Hazard Analysis:

Task Step	Hazard	Control Measures
Storing Chemicals in the Office Setting	Chemicals stored in ERM offices or Field Project Offices may lead to employee chemical exposure, chemical spills, or fires from flammable materials.	If at all possible, do not store chemicals in the office environment. For each chemical product used by ERM employees or stored in an ERM field or office location, a MSDS sheet must be obtained and kept on-file. A chemical inventory list must be prepared and updated as new or different chemicals are procured. Chemical containers must be labeled in accordance with OSHA regulations. Train all employees who will use or be present in the general vicinity of chemicals annually about hazard communication. If new or updated chemicals are procured, hazard communication training must be given to affected employees prior to using or storing the chemical.

North America Job Hazard Analysis
Hazard Communication

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 10	

Task Step	Hazard	Control Measures
Using Chemicals	Employees may be exposed to chemical hazards via skin contact, ingestion, inhalation, or punctures in the skin.	Before using any chemical, make sure a jobsite WARN Health and Safety Plan (HASP) has been prepared and taken the chemical being used into account. Wear protective equipment as specified in the HASP. If chemicals are being used by subcontractors, ensure all employees on the jobsite have been told about the chemical in-use and are protected. If chemical exposure occurs, even if medical symptoms are not present, inform the Field Safety Office or Office H&S Contact.
Large Chemical Spills	Large chemicals spills may expose employees to significant health hazards.	For large chemical spills (generally anything larger than 1 gallon in size), HAZWOPER training is required to perform any action other than retreating from the area and contacting appropriately-trained personnel to mitigate the spill. Do not attempt to stop or clean-up a spill without current HAZWOPER training, current medical clearance, current respirator training, and a current respirator fit-test.

Personal Protective Equipment Required for this Task:

Type	Description
None	

Training Required for this Task:

Type	Description
Hazard Communication	An annually-required training discussing general chemical hazards, MSDS sheets, and how to respond to general chemical emergency situations.

North America Job Hazard Analysis
Hazard Communication

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 10	

Forms Associated with this Task:

Type	Description
Material Safety Data Sheet (MSDS)	An informational document containing information about chemical composition, hazardous properties, and steps to take in emergency situations involving chemicals.
International Chemical Safety Card	A chemical-specific document developed by the National Institute of Occupational Safety and Health providing abbreviated information similar to a MSDS.

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Airborne Contaminants and Reproductive Hazards

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 11	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Description of specific chemical air contaminants requiring additional regulatory actions.

Hazard Analysis:

Task Step	Hazard	Control Measures

North America Job Hazard Analysis
Airborne Contaminants and Reproductive Hazards

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 11	

Task Step	Hazard	Control Measures
Exposure to specific OSHA-regulated chemical hazards during work	Certain chemicals have been found to present more significant long-term health hazards to employees when they are exposed to them, including sensitization, development of certain cancers, and others.	If the following chemicals are being used on a jobsite, and work will occur for more than 30 consecutive days, OSHA regulations generally require a plan to mitigate exposures, additional training, and medical monitoring in some cases. • 13 carcinogens (see 29 CFR 1910. • Asbestos • Vinyl chloride • Inorganic arsenic • Lead • Hexavalent chromium • Cadmium • Benzene • Coke oven emissions • 1,2-dibromo-3-chloropropane • Acrylonitrile • Ethylene oxide • Formaldehyde • Methylenedianiline • 1,3-butadiene • Methylene chloride
Exposure to reproductive chemical hazards during work	Certain chemicals have been found to affect the reproductive systems in males and females and require additional personnel protection if used.	Chemicals posing reproductive hazards will be specified in site-specific HASPs. Follow all provisions of the HASP to minimize or eliminate exposure to reproductive hazards.

Personal Protective Equipment Required for this Task:

Type	Description
Varies	PPE varies depending on the specific chemical being used. Consult the HASP for jobsite-specific guidance.

North America Job Hazard Analysis
Airborne Contaminants and Reproductive Hazards

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 11	

Training Required for this Task:

Type	Description
Varies	Training that must be given to employees varies on the specific chemical being used. Consult the HASP for jobsite-specific guidance.

Forms Associated with this Task:

Type	Description
None	

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Personal Protective Equipment

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)

JHA No.: 14

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:
Guidelines for selection and use of personal protective equipment (PPE). PPE is only to be used after engineering and administrative controls have been considered and found to be non-feasible. Guidance for respiratory protection and fall protection is included in separate JHAs

Hazard Analysis:		
Task Step	**Hazard**	**Control Measures**
General fieldwork	A head injury could occur from a falling or flying object, or a head injury could be sustained from bumping into something. Wearing a "typical" hardhat around electrical equipment may result in electrical shock.	A hard hat meeting the American National Standards Institute (ANSI) Z-89.1 standard must be worn. These hardhats contain an inner suspension system that should be checked regulatory to ensure straps are not worn and that space exists between the shell of the hardhat and the suspension straps. Electrical shock protection hardhats – Class A for low voltage (up to 2,200 volts), Class B for high voltage (up to 20,000 volts), and Class C for no electrical shock protection.
General fieldwork	A foot injury could occur from a falling or rolling object, or an object may pierce the sole of the shoe. Electrical shock may occur with steel-toe boots.	Steel toe protective footwear should be worn that meets or exceeds the American Society for Testing and Measurement (ASTM) F2413-05 standard. Footwear worn around electrical circuits should also be non-conductive.

North America Job Hazard Analysis
Personal Protective Equipment

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 14	

Task Step	Hazard	Control Measures
Cutting by hand	Hand injury could occur from handling an object with sharp edges of a fixed open-blade knife.	Fixed open-blade knives (such as pocket knives) may not be used on ERM jobsites, with few exceptions. If their use is required, cut-resistant gloves (such as Kevlar) must be worn and the PM or FSO must be informed prior to their use. Employees performing significant amounts of cutting tool use should wear high-visibility gloves to encourage awareness of where hands are being placed.
Handling chemicals by hand	Dermal exposure to hands from chemicals during soil and/or groundwater sampling.	Wear nitrile or latex protective gloves when handling sample media. Double-layering these gloves is a good idea for added protection. If acidic or caustic chemicals are present, wear outer neoprene or rubber gloves.
O&M or Subsurface Injection	Dermal exposure to body from chemicals during operations and maintenance activities or subsurface liquid injection activities.	When working with commercial, full-strength chemicals ensure splash protection is worn (such as a polyethylene coated suit) and that gloves and boots are taped to the suit to prevent liquid splash.
General fieldwork Work around liquid splash and/or flying particle hazards	Foreign object or liquid splash to the eye.	Safety glasses conforming to the ANSI Z-87 standard must be worn for field activities. Safety glasses are appropriate for use when general eye protection is needed. For liquid splash hazards or hazards from flying particles, tight-fitting safety goggles should be worn. A faceshield should be considered for use when splash hazards from commercial, full-strength chemicals.
Work around active roadways	Struck by moving vehicles when working outside or along a roadway.	High-visibility safety vests should be worn when working in parking lots or by active roadways. Class I may be used when traffic is below 25 mph, Class II for 25-50 mph, and Class 3 for >50 mph.

North America Job Hazard Analysis
Personal Protective Equipment

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 14	

Task Step	Hazard	Control Measures
Work in high noise environments	Hearing damage from noise exposure greater than 85 decibels.	Attempt to perform work when elevated noise is not an issue. If work must be performed during high noise, wear hearing protection in the form of earplugs or earmuffs. Further details are given in the "Work in High Noise Environments" JHA.
O&M or Lockout/Tagout/Tryout	Electrical shock	Lockout/tagout/tryout should be performed by licensed electricians or others that have been specifically authorized by ERM to do so. PPE appropriate to this work includes a cotton t-shirt, Class II Electrical Arc Protection suit, Class O (low voltage) gloves, and non-conductive footwear.

Training Required for this Task:

Type	Description
Personal Protective Equipment	PPE training, normally included in 8-hour refresher training, provides guidance on the selection, inspection, use, maintenance, and decontamination of different types of PPE

Forms Associated with this Task:

Type	Description
None	

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Work in Cold Environments

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 16	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for working in areas where cold stress may occur.

Hazard Analysis:

Task Step	Hazard	Control Measures
Drilling Oversight	Cold Weather	Dress Appropriately (gloves, hat heavy coat), If you become cold take a break inside building or car to warm up, Monitor Weather.
Excavation Oversight	Cold Weather	Dress Appropriately (gloves, hat heavy coat), If you become cold take a break inside building or car to warm up, Monitor Weather.

Personal Protective Equipment Required for this Task:

Type	Description
Level D	

Training Required for this Task:

Type	Description

North America Job Hazard Analysis
Work in Cold Environments

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)

JHA No.: 16

None

Forms Associated with this Task:

Type	Description

None

Site-Specific Job Hazard Analysis Completed by:

Name	Date
Gene Gabay	1/19/2011

North America Job Hazard Analysis
Respiratory Protection

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)

JHA No.: 17

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for selection, use, and maintenance of respiratory protection.

Hazard Analysis:

Task Step	Hazard	Control Measures
Offsite Preparation	Employee chemical exposure could occur or unqualified personnel could be put at risk if not specified early in the planning process.	The health and safety plan must specify the need for respirators, including the requirement that employees working on the project must be medically cleared to wear a respirator and have a current respirator fit-test on the type and model respirator they will be expected to wear. If organic vapor cartridges are to be used, develop a cartridge change schedule. Include the following exposure limits for each contaminant if they are available. The lowest exposure limit of these should be used as the trigger to don respiratory protection: • OSHA Permissible Exposure Limit (PEL) • NIOSH Recommended Exposure Limit (REL) • ACGIH Threshold Limit Value (TLV) • Immediately Dangerous to Life or Health (IDLH) Additionally, respirator cartridge types must be specified in the health and safety plan and available on-site.

North America Job Hazard Analysis
Respiratory Protection

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 17	

Task Step	Hazard	Control Measures
Prior to Using Respirator	Respirators that are not cleaned, inspected, or maintained well will not provide protection as designed.	Prior to donning a cartridge-type respirator, inspect to ensure it is in good condition, including straps, rubber sealing surfaces, and non-visible parts such as inhalation and exhalation valves. Do not use respirators with cracked rubber parts or stretched straps unless repaired. Clean if necessary using an alcohol wipe or mild soap and water solution. Cartridge-type respirators may not be used if chemical exposures exceed 10 times the OSHA PEL or are at IDLH levels. Inspect supplied air (SCBA at least monthly, and prior to each use. Inspections of SCBAs and other emergency-type respirators must be documented.
Don the Respirator	Incorrect seal on the respirator could cause employee chemical exposures.	Prior to donning respirators, personnel must be clean-shaven in areas of the face where the respirator seal touches, including any inner nose cups. For cartridge-type respirators, place the cartridges on the respirator facepiece. Cartridges should not be torqued to tighten (only slightly tightened). The respirator must be donned prior to other personal protective equipment in the head/neck area so that nothing comes between the respirator straps and the head surface. Safety glasses, hard hats, etc. must be donned after the respirator. Because of this, ERM prefers employees wear full-face respirators when possible. For cartridge-type respirators, perform a positive and negative fit-check to make sure the seal of the respirator is good.

North America Job Hazard Analysis
Respiratory Protection

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 17	

Task Step	Hazard	Control Measures
Performing Work Wearing Respirators	Tendency to readjust respirator facepieces when sweating is high, and can result in chemical exposures.	Excessive sweating may cause the respirator facepiece to slide on the wearer's face resulting in a compromised respirator seal. If this occurs, stop work and move to an area with no chemical contamination (go through the decontamination line if present), readjust the respirator, and perform positive and negative fit-checks to ensure a proper face seal.
	Particulate cartridge clogging may occur, or chemicals may break through chemical cartridges.	If using particulate cartridges (N, R, or P-types), and it becomes difficult to breathe, move to a clean area and change cartridges. If using chemical cartridges other than organic vapor-types, change cartridges if any amount of chemical odor breaks through the respirator cartridge. For organic vapor cartridges, change respirator cartridges according to the cartridge change schedule in the health and safety plan.
Doffing Respirators	Chemical exposure could occur if respirators are taken off incorrectly.	If a decontamination line is present, proceed through the line as directed. If no decontamination line is being used, all other personal protective equipment except gloves should be removed before taking the respirator off. Once removed, respirator cartridges should be discarded and facepieces cleaned. If sharing respirators, the respirator must be cleaned and sanitized before use by another employee.

Personal Protective Equipment Required for this Task:

Type	Description
None	

North America Job Hazard Analysis
Respiratory Protection

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 17	

Training Required for this Task:

Type	Description
Respirator Training	Annually-required training necessary for employees to wear positive or negative-pressure respirators.
Respirator Fit-Test	An annually-required test of the fit of a certain model and type respirator to an employee's face. All negative-pressure (filter or cartridge-type) and supplied-air facepieces must be fit-tests. Employees must be fit-tested on each model and type of respirator to be worn.

Forms Associated with this Task:

Type	Description
SCBA Inspection Checklist	Checklist documenting monthly inspection of self-contained breathing apparatus units (SCBA).

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Forklift Operations

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 18	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for working around forklifts.

Hazard Analysis:

Task Step	Hazard	Control Measures
Offsite Preparation	Forklift use poses significant hazards to operators and employees.	It is ERM policy and practice that our employees do not operate forklifts except in unusual circumstances. The health and safety plan must contain provisions for forklift operation or oversight of forklift operations. All forklift operators must be trained and certified to operate forklifts in accordance with 29 CFR 1910.178. Evidence of training and certification must be supplied to ERM and kept in project files.
Pre-Use Inspection	Critical safety equipment in disrepair poses significant contact hazards for operators and employees.	Daily, prior to operation, forklifts must be inspected for conditions that adversely affect the safety of the forklift. Any forklift found to be unsafe shall have the ignition key removed and be tagged "OUT OF SERVICE" until repaired.

North America Job Hazard Analysis
Forklift Operations

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 18	

Task Step	Hazard	Control Measures
Forklift Operation	Tip-over and other significant hazards are posed by improper forklift operation.	Lifting capacity of forklifts may not be exceeded for any reason. The lifting capacity of the forklift is located on a plate attached to the forklift. Unstable loads must be made stable prior to lifting. Personnel may not ride forklifts except in approved cages or platforms. All personnel driving or riding forklifts must wear seatbelts. Forklifts should be driven slowly around turns and curves due to having a high center of gravity. Forklifts should always travel in reverse when going down inclines. In all cases the operator line-of-sight must be in the direction of travel – the head should be turned when backing down an incline. When carrying a raised load, do not drive on a slope and come to a complete stop before changing directions. All driving on slopes should be done perpendicular to the slope.
Ending Forklift Operation	Forklifts left in "non-zero energy" position could injure employees.	Always bring raised loads or empty forklift tines to ground level when operation of the forklift is done for the day and remove keys. For forklifts using LP Gas, the gas tank should be removed and stored in a designated storage area.

Personal Protective Equipment Required for this Task:

Type	Description
None	

North America Job Hazard Analysis
Forklift Operations

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 18	

Training Required for this Task:

Type	Description
Forklift Operation	Classroom training teaching the basics of operating forklifts.
Forklift Operator Certification	Road-test where forklift operator's driving skills are critiqued.

Forms Associated with this Task:

Type	Description
Daily Forklift Inspection Checklist	Inspection form to be used daily prior to operating forklifts. All major safety-related components are included in the inspection.

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Heavy Equipment Operations

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 19	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for working around heavy equipment.

Hazard Analysis:

Task Step	Hazard	Control Measures
Offsite Preparation	Untrained workers operating heavy equipment pose potential life-threatening hazards to employees.	ERM policy and practice is that our employees do not operate heavy equipment except in unusual circumstances. If ERM personnel are to operate heavy equipment, this must be stated in the health and safety plan for the project. Only employees with training and/or demonstrated experience operating heavy equipment may do so. Subcontractor personnel operating heavy equipment must be trained and/or have demonstrated experience operating such equipment. ERM must be in possession of evidence of training and/or experience prior to Subcontractor personnel operating such equipment. All heavy equipment must meet applicable design standards (ANSI, etc.). A copy of the operating manual must be carried on all heavy equipment, including a load-rating chart and any special operating considerations.

North America Job Hazard Analysis
Heavy Equipment Operations

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 19	

Task Step	Hazard	Control Measures
Heavy Equipment Operation	Injury to operator and those in immediate vicinity.	Before starting operations, operators must ensure no one is working on or near machinery. If equipment is to be operated in close proximity to other workers, a spotter must be working in tandem with the operator. All heavy equipment must be inspected daily to ensure good working order. Critical safety items, such as brakes, backup alarms, horns, etc. must be in working order. Machinery with critical safety items in disrepair may not be used until they are fixed. Operators must operate equipment while wearing seatbelts, if provided, and at reasonable speeds. Mounting/dismounting a moving machine is prohibited. Do not transport personnel or equipment in machinery not designed for this purpose. Overhead obstructions must be assessed before operating machinery. If equipment is to be operated in close proximity to overhead obstructions, a spotter must be working in tandem with the operator. Safe working distances must be specified in the health and safety plan or JHA supplied by the subcontractor.
Ending Heavy Equipment Operations	Leaving equipment in a non-neutral position poses contact hazards.	All heavy equipment must be placed in a neutral position when not in operation. Dump truck beds must be lowered, buckets must be at ground level, forklift tines must be at ground level, etc. Keys must be removed from all heavy equipment when not in use4.

North America Job Hazard Analysis
Heavy Equipment Operations

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 19	

Personal Protective Equipment Required for this Task:

Type	Description
High-visibility safety vest	Vest worn by equipment operators and those working in the area impacted by moving machinery

Training Required for this Task:

Type	Description
Heavy Equipment Operation	Operators must be trained and/or have demonstrated experience for each type of heavy equipment they will operate.

Forms Associated with this Task:

Type	Description
Heavy Equipment Inspection form	Form for documenting daily heavy equipment inspections

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Portable Hand and Power Tools

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 20	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for working with portable hand and power tools.

Hazard Analysis:

Task Step	Hazard	Control Measures
Gather tools to take to jobsite	An improper tool available at jobsites encourages unsafe behaviors and could lead to injury.	Ensure tools taken to jobsites are kept in optimal condition (sharp, clean, oiled, etc.) to ensure efficient operation. Tools must only be used for their intended purposes – tools should not be used as pry-bars. Ensure power cords attached to powered-equipment are not damaged. Any damaged tool or electrical cord must be tagged and taken out of service.
Using cutting tools	Major and/or minor cuts to personnel	Fixed open-blade knives (such as pocket knives) may not be used on ERM jobsites, with few exceptions. If their use is required, cut-resistant gloves must be worn while using them and the PM or FSO must be informed prior to their use. Employees performing significant amounts of cutting tool use should must high-visibility gloves to encourage awareness of where hands are being placed.

North America Job Hazard Analysis
Portable Hand and Power Tools

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 20	

Task Step	Hazard	Control Measures
Using screwdrivers	Puncture injuries	Do not hold objects in the palm of your hand and press a screwdriver into it – these objects should be placed on a flat surface. Do not use screwdrivers as hammers, or use screwdrivers with broken handles. Use insulated screwdrivers for work on electrical equipment.
Using hammers	Creation of sparks	Use brass hammers in areas where creating sparks would pose ignition hazards.
	Particles may lodge in employee's eyes	Always use safety glasses when striking any object with a hammer. If hammer-head shows signs of mushrooming, replace it immediately.
	Loose handles may create a projectile hazard	Replace any hammer with a loose handle so the hammer-head does not detach and cause injuries.

Personal Protective Equipment Required for this Task:

Type	Description
High-visibility glove	Gloves typically in fluorescent green, orange, or yellow.
Cut-resistant glove	Limited protection is afforded by leather gloves from cuts. Kevlar gloves provide more protection when significant cut/puncture hazards exist.

Training Required for this Task:

Type	Description
None	

North America Job Hazard Analysis
Portable Hand and Power Tools

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 20	

Forms Associated with this Task:

Type	Description
None	

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Confined Space Entry Operations

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 21	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for permit-required and non permit-required confined space entry operations.

Hazard Analysis:

Task Step	Hazard	Control Measures
Offsite Preparation	Entering confined spaces poses various life-threatening hazards to employees.	ERM policy and practice prohibits our employees from entering a permit-required confined space, except in unusual circumstances. If permit-required confined spaces are to be entered by either ERM personnel or Subcontractor personnel, a North America Safety Team member must be consulted, and a confined space entry program must be instituted.
Onsite Work	Entering confined spaces poses various life-threatening hazards to employees.	Any person entering a permit-required confined space must have received confined space entry training. For subcontractors performing confined space entry, a minimum of three subcontractor personnel are required for this task (supervisor, attendant, and entrant).

Personal Protective Equipment Required for this Task:

Type	Description
None	

North America Job Hazard Analysis
Confined Space Entry Operations

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 21	

Training Required for this Task:

Type	Description
Permit-Required Confined Space Entry	Training on confined space entry operations, normally lasting 16-24 hours.

Forms Associated with this Task:

Type	Description
None	

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Energized Equipment and Lockout-Tagout

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 22	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for working on or around electrically energized equipment.

Hazard Analysis:

Task Step	Hazard	Control Measures
Offsite Preparation	Locks, tags, and trained personnel may not be present at the jobsite when needed.	The health and safety plan for projects involving work on or oversight of work on electrical equipment must include provisions for lockout-tagout. Locks and tags must be on-hand. Also, after-hours contact information for employees that will apply locks and/or tags must be obtained and documented in the health and safety plan. Personnel performing lockout-tagout operations must have received documented lockout-tagout training. Staff these projects with personnel who have attended this training. Collect training certificates from subcontractors who will perform this work.

North America Job Hazard Analysis
Energized Equipment and Lockout-Tagout

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 22	

Task Step	Hazard	Control Measures
Work on Energized Equipment	Electrocution may occur if lockout-tagout is not performed correctly.	Before working on electrically-energized equipment, it should be brought to a "zero-energy state". This may involve turning the equipment's power source off, or turning specific electrical breakers to the off position. "Zero-energy" is not attained until the individual working on the machinery attempts to turn the machine on and is unsuccessful. The individual(s) performing lockout-tagout must inform other personnel in the area that work on equipment is about to occur, and to not attempt to turn equipment on for any reason. Locks AND tags must be placed on equipment power sources by each individual performing work on the equipment using personally-identifiable locks. Tags must read "DANGER – DO NOT OPERATE" and be resistant to wear and tear by the environment they are being used in. In certain situations, the use of locks may not be possible (machinery must be kept energized to perform required work). In these cases the Project Manager and Field Safety Officer must be directly involved when tagout is taking place.
Remove locks and tags	Removing locks and/or tags prematurely may lead to electrocution.	Do not allow anyone other than the individual who placed a lock/tag in-place to remove it. If the individual who placed the lock/tag is not immediately available to remove it, work must be suspended until he/she becomes available. If the individual who placed the lock/tag has left the jobsite, use the contact information located in the health and safety plan to attempt to contact them. If they are unable to be contacted, their lock/tag may only be removed through a joint decision from the PM, FSO, and Subcontractor supervisor.

North America Job Hazard Analysis
Energized Equipment and Lockout-Tagout

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 22	

Task Step	Hazard	Control Measures
Lockout Tagout Process Inspection on Sites Longer than 1 Year	Changes to electrically-energized equipment may cause lockout-tagout procedures to become obsolete.	For all sites where work extends beyond 1 year, a lockout-tagout process inspection must occur. The inspection will verify, for each piece of electrically-energized equipment normally worked on, that lockout-tagout procedures in-place are still valid. These process inspections must be documented.

Personal Protective Equipment Required for this Task:

Type	Description
None	

Training Required for this Task:

Type	Description
Lockout-Tagout	Lockout-tagout training describes the process of de-energizing electrical equipment prior to performing work or maintenance on the equipment, and the safeguards that must be used to ensure electrical hazards to employees are controlled.

Forms Associated with this Task:

Type	Description
None	

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Fall Protection

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 23	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Any work at heights exceeding 6 feet.

Hazard Analysis:

Task Step	Hazard	Control Measures
Offsite Preparation	Not having fall protection when needed on a project site. Untrained employees may not understand how or when to use fall protection.	When developing the health and safety plan, include specific fall protection equipment needs known at the time to ensure it is available for use at the site. Using fall protection requires that employees have received formal training. Staff projects requiring fall protection with employees who have attended fall protection training.
Work at heights exceeding 6 feet from any lower level	Significant injury could occur if employees are not wearing fall protection in these instances or other protective devices are not installed.	For work greater than 6 feet higher than a lower level (could be the ground or other situation with multiple levels) ensure employees are wearing appropriate fall protection. Provide protection to employees below by putting protection from falling objects in place (described below). Provide means of quickly rescuing any person wearing fall protection on projects or ensure the employee can self-rescue.

North America Job Hazard Analysis
Fall Protection

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 23	

Personal Protective Equipment Required for this Task:

Type	Description
Fall Protection	Fall protection can take on many forms depending on the task(s) involved, including vertical/horizontal lifeline systems, full body harnesses, shock absorbing lanyards, nets, retractable devices, and others. Check with the North America Safety Team for guidance when fall protection is required on your project. All fall protection must meet applicable ANSI, ASTM, or OSHA requirements.
Protection from Falling Objects	Protection from falling objects can take on many forms, including toeboards/screens/guardrail systems, canopy structures, or work practices preventing people from entering areas where objects may fall from heights.

Training Required for this Task:

Type	Description
Fall Protection Training	Training on the use, care, and maintenance of fall protection equipment.
Fall Protection Retraining	Must be done after incident involving fall protection, when using new fall protection equipment, or when wearing fall protection on a new jobsite.

Forms Associated with this Task:

Type	Description
None	

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Portable Ladder Use

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 24	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for working with portable ladders.

Hazard Analysis:

Task Step	Hazard	Control Measures
Select ladder for use	Selection of a ladder with oil/grease on its surface or a defective/poorly-maintained ladder may lead to not having a suitable ladder at the jobsite. Conductive ladders used around energized equipment could cause electrocution.	Inspect ladders before taking them to jobsites to ensure they are clean, sturdy, and appear well-maintained. Any ladder found to be unusable must be tagged and taken out of service. For work around energized electrical equipment, choose a non-conductive ladder or one with non-conductive side rails.
Loading/Unloading ladder	Muscle strain or other injury may occur from improper lifting of ladders.	Before lifting ladders onto or off of a transport vehicle, pause and determine if the lift is safe to do alone. If not, get help from other individuals.
Placing ladder	Ladders may not be in good working order. Ladders placed on uneven ground or slippery locations may cause ladder failure. Overhead electrical lines may cause electrocution.	Always inspect ladders each time before they are used. Do not use a ladder that appears to be poorly maintained. Place ladders on stable and level surfaces. If not possible, secure the ladder to prevent accidental movement. Use slip-resistant ladder feet in slippery locations. These do not take the place of proper placement or holding a ladder in-place. Ensure no contact between ladders and overhead lines.

North America Job Hazard Analysis
Portable Ladder Use

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 24	

Task Step	Hazard	Control Measures
Going up/down ladder	Employee may lose balance and fall when going up or down a ladder.	Whenever employees are on ladders they should be facing the ladder, including going up and down. Keep hands free and grasp the ladder with one hand at all times. Do not carry loads in your hands on ladders.
Working from ladder	Various hazards could cause employees to lose balance and fall.	Only one person may be on a ladder at any one time. Keep both feet on the ladder rungs – do not place one foot off the ladder onto other equipment. If you must stand backwards on the ladder, and anytime an unstable situation exists, fall protection must be provided and used by employees. In these situations barricade or rope-off the area being worked in to avoid potentially hurting others. Follow any label directions about standing on the top steps of ladders to perform work. If no label exists, do not stand on the top two rungs of the ladder to perform work. Secure all tools and supplies to ensure they do not fall and hurt others. Do not perform extended reaches during work. If at least one foot cannot stay in contact with ladder rungs, dismount the ladder and move to a more convenient location.

Personal Protective Equipment Required for this Task:

Type	Description
None	

Training Required for this Task:

Type	Description
None	

North America Job Hazard Analysis
Portable Ladder Use

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 24	

Forms Associated with this Task:

Type	Description
Ladder Inspection Checklist	A checklist that may be used to document inspections of portable ladders

Site-Specific Job Hazard Analysis Completed by:

Name	Date

Attachment 2

Subsurface Clearance Field Process Checklist & Subsurface Clearance Location Disturbance Permit

Subsurface Clearance Field Process Checklist

Site/Project Name: _____

Client: _____

ERM Project No.: _____

SSC Exp. Person: _____

Project Information Utilized for Field SSC Activities	Yes	No	N/A	Comments
Contact Person requested and identified				
Subcontractors prequalified and approved				
ERM / client SSC requirements have been communicated to all field personnel (including subcontractors)				
As-built drawings, site plans, aerial photographs, and/or other information sources available and reviewed				
Site Plan(s) / Drawing(s) developed showing subsurface lines/structures, Critical Zones, and planned Ground Disturbance Locations				
SSC Experienced Person with current SSC training assigned				
Project staff with current SSC training assigned				
UXO / MEC risks assessed: UXO / MEC is present or potentially present				If Yes, stop work and contact PIC

General Field Activity & Site Walk	Yes	No	N/A	Comments
HASP available, reviewed, and signed by project team				
Site walk Visual Clues / site features (below) integrated into Site Services Model				

Identified Visual Clue	Yes	No		Identified Visual Clue	Yes	No
Lights				Pipeline markers		
Signage				Fire hydrants		
Sewer drains / cleanouts				Sprinkler systems		
Cable markers				Water meters		
Utility poles with conduit leading to the ground				Natural gas meters		
Utility boxes				UST fill ports and vent pipes		
Manholes				Equipment locations		
Pavement scarring				Steam lines		
Distressed vegetation or vegetation in linear pattern				Remote buildings with no visible utilities		

Comments / Others:

Contact Person Approval of Ground Disturbance at All Locations (indicate verbal approval by printing "Verbal" in the signature space)

Name (Print)	Company	Name (Sign)	Date / Time

Utility Markouts	Yes	No	N/A	Comments
Public Utility Markouts completed (where available; waiver required if "NO")				
List utilities notified:				
Responses received from ALL companies notified?				
Private Utility Markout completed (waiver required if "NO")				
Performed by:				
Type of equipment/methods used:				
Note any limitations (e.g., sources of interference, geology, etc.):				
Final Critical Zone determinations made by the SSC EP				

Subsurface Clearance Field Process Checklist

Site/Project Name: _____

Client: _____

ERM Project No.: _____

SSC Exp. Person: _____

Critical Zones		
Are there any ground disturbance locations <u>known</u> or <u>suspected</u> to be inside Critical Zones?	☐	**Yes.** PIC and BU MP (or designee) must BOTH grant waiver for work within the Critical Zone. The SSC Location Disturbance Permit or equivalent is required for those locations.
	☐	**No.** Physical Clearance will proceed to the deeper of: 0.6 m / 2 feet below the frost line or 1.5 m / 5 feet below ground level, whichever is deeper.

Overhead Clearance	Yes	No	N/A	Comments
Overhead utility lines in the general vicinity of ERM work onsite?				
If overhead utilities are present, has nominal voltage been determined? If yes, list in comments section.				Voltage:
Overhead clearances confirmed with equipment operators for safely deploying equipment to the location? (The minimum horizontal distance from any point on the equipment to the nearest overhead electrical power line should adhere to the minimum clearance requirements stipulated by regulation, utility companies, client requirements, and/or industry best practice.)				Clearance distance(s):
Proximity alarms and /or spotters necessary to ensure safe clearances?				
If the equipment is closer than the minimum clearance distance to the overhead utility, can utility be de-energized via formal lockout/tagout (LOTO) program?				
If utility cannot be de-energized, alternate plan developed with approval from the PIC and client/site owner?				

Clearance for Point Disturbances	Yes	No	N/A	Comments
Physical Clearance technique used (waiver required if no Physical clearance performed)				Specify:
Diameter of physical clearance at least 125% larger than outside diameter of largest downhole tool (150% is best practice)				
Physical Clearance successfully completed at all locations				

Clearance for Excavations	Yes	No	N/A	Comments
Communicate excavation plan and Excavation Buffer location(s) to subcontractor. Delineate excavation buffers.				
There are disturbance locations known or suspected to be inside Critical Zones				
De-energize subsurface services via formal LOTO program prior to beginning excavation				

Additional Notes:

SSC Process Completed By (SSC Experienced Person)		
Name (Print)	Name (Sign)	Date / Time

Subsurface Clearance Location Disturbance Permit

Disturbance Location Designation:

ERM Project No.: _____

SSC Exp. Person: _____

Contact Person Approval of Ground Disturbance Locations (indicate verbal approval by printing "Verbal" in the signature space)

Name (Print)	Company	Name (Sign)	Date / Time

Critical Zone Determination and Clearance Depth (It is not preferred to initiate Ground Disturbance Activities within a Critical Zone)

If the Disturbance Location is known or suspected to fall within a Critical Zone, then a sketch (see reverse) or other map **must be** used to confirm proximal Critical Zones. Sketch / map must be to scale.

This Location Is:

☐ Inside a Critical Zone. Partner-in-Charge (PIC) and Business Unit Managing Partner (BU MP) must BOTH grant waiver for disturbance at this location. Ensure documentation in the SSC Project Plan addendum to the HASP. Physical Clearance will proceed to the deeper of: **0.6 m / 2 feet below the frost line, 0.6 m / 2 feet deeper than the expected invert elevation of the service, OR 2.4 m / 8 feet below ground level.**

☐ Outside a Critical Zone.
Physical Clearance will proceed to the deeper of: **0.6 m / 2 feet below the frost line or 1.5 m / 5 feet below ground level.**

Physical Clearance Technique at This Location

☐ Cleared using the following techniques / equipment:

Clearance depth and diameter (specify units):

☐ None – or not completed to required depth or diameter. Waived by PIC and BU MP.
(Ensure documentation in the SSC Project Plan addendum to HASP.)

Reason: Date / Time:

Physical Clearance Executed & Observed By:

Company	Representative(s)	Date / Time Complete	Notes

Was any Subsurface Structure discovered (damaged or undamaged) during Clearance?

☐ No (Proceed) ☐ Yes If Yes: Work stopped and discussed with PIC (Date / Time): _____

Agreed Action: _____

SSC Process Complete

Name of SSC Experienced Person (Print)	Name (Sign)	Date / Time

Critical Zone Determination Sketch (use this or other map to confirm proximal Critical Zones).

Instructions:

1. Create a sketch of the disturbance (in the space to left or attach) that is drawn to scale and contains the following information:
   a. The disturbance location
   b. Surface landmarks and overhead obstructions (buildings, roads, overhead lines, etc.)
   c. Critical landmarks and Subsurface Structures (tanks, transformers, wells, racks, etc.)
   d. Underground services:
      i. Identified in the Site Service Model
      ii. Marked by Public and Private utility markouts
      iii. As relayed by the Contact Person
      iv. Nearest shutoff / isolation mechanism for each
   e. Any surface clues as to potential underground services (junction boxes, drains, disturbed concrete, signage, etc.)
   f. The site property boundary
2. Use your sketch to mark Critical Zones (3m or 10 feet) around critical landmarks and underground structures / services.
3. For Excavations, use your sketch to mark Excavation Buffers (0.6m or 2 feet) from Subsurface Structures.
4. If the disturbance location falls inside the Critical Zone, the preferred course of action is step out to a safe location outside a Critical Zone.
5. Disturbance within a Critical Zone can only proceed with both PIC and BU MP (or designee) approval.

Attachment 3

Community Air Monitoring Plan

New York State Department of Health
Generic Community Air Monitoring Plan

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical-specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for volatile organic compounds (VOCs) and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate NYSDEC/NYSDOH staff.

Continuous monitoring will be required for all <u>ground intrusive</u> activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a **continuous** basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

All 15-minute readings must be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored **continuously** at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

All readings must be recorded and be available for State (DEC and DOH) personnel to review.

June 20, 2000

P:\Bureau\Common\CommunityAirMonitoringPlan (CAMP)\GCAMPR1.DOC

Attachment 4

Daily Safety Meeting Form

Daily Safety Meeting Documentation Form

Project Name: Project Number: Meeting Date & Time: Meeting Leader:

Document Routing	
FSO	Retain copy in site health & safety file.

What work will be conducted on site today and by whom?

Work Task	Conducted By

What overlapping operations/simultaneous operations will occur today?

Any follow-up from previous Major Incidents, Near Misses, Unsafe Acts or Unsafe Conditions discussed today?

List any new / short-service personnel on site today?

Safety Meeting Core Topics – All Site Workers *and* Visitors

- ☐ What PPE is required in order to enter the work zone?
- ☐ What are the potential hazards associated with today's work. How will they be managed?
- ☐ What are the potential impacts of planned activities to: Visitors? Nearby workers? Public?
- ☐ Is everyone aware that they are empowered to stop work if something is questionable or unsafe?
- ☐ What happens and who do you contact if there is an injury or emergency? If working at an active facility, how will you be alerted of an emergency and what will you do?
- ☐ Who do you contact if you have questions, or before deviating from written procedures?
- ☐ Where is fire extinguisher, first aid kit, eyewash, safety shower located?
- ☐ Are any work permits required? Are permits completed and posted in plain view of workers?
- ☐ Have all excavation / borehole locations been cleared of underground utilities/structures, in accordance with ERM and client-specific subsurface clearance procedures?
- ☐ Have all tools / equipment / vehicles been inspected today to ensure safe operating condition?
- ☐ Will a follow-up safety meeting be conducted after lunch?
- ☐ Has anything unexpected or out-of-the-ordinary occurred on this job recently to share?
- ☐ What is the worst that could happen if something goes wrong today?

Daily Safety Meeting Documentation Form

Project Name: Project Number: Meeting Date & Time: Meeting Leader:

Safety Topics Related to ERM 2011/2012 Incident Trends – All Site Workers *and* Visitors

- ☐ What activities occurring today could result in hand injuries? Is everyone aware that the use of fixed open-blade knives is not permitted without cut-resistant gloves?
- ☐ Does the site pose natural hazards to be avoided? Thorny underbrush/ticks/poison ivy?
- ☐ What areas of the site have slip/trip/fall hazards? Are everyone's work boots in good shape?
- ☐ How will the on-site team avoid vehicle accidents? Is everyone aware that taking their eyes off the road for more than 2 seconds (for any reason) leads to vehicle accidents?

Who attended the safety meeting today (employees, subcontractors, visitors)?

Name	Company	Signature	Sign-In Initials*	Sign-Out Initials**

* Initials in this space verify that the employee is fit for performing work.
**Initials in this space verify that the employee was uninjured during the workday.

Who visited the site today but was not involved in work activities?

Name	Company	Arrival Time

Attachment 5

Project Sign-in Sheet

Name	Signature	Company	Date

Attachment 6
Hospital Route Map & Directions

Site Location: 40 Voice Road, Carle Place, NY 11514

Nearest Hospital Name: Winthrop University Hospital

Hospital Location: 259 First Street, Mineola, NY 11501

Hospital Telephone: (516) 663-0333

Directions to the Hospital:

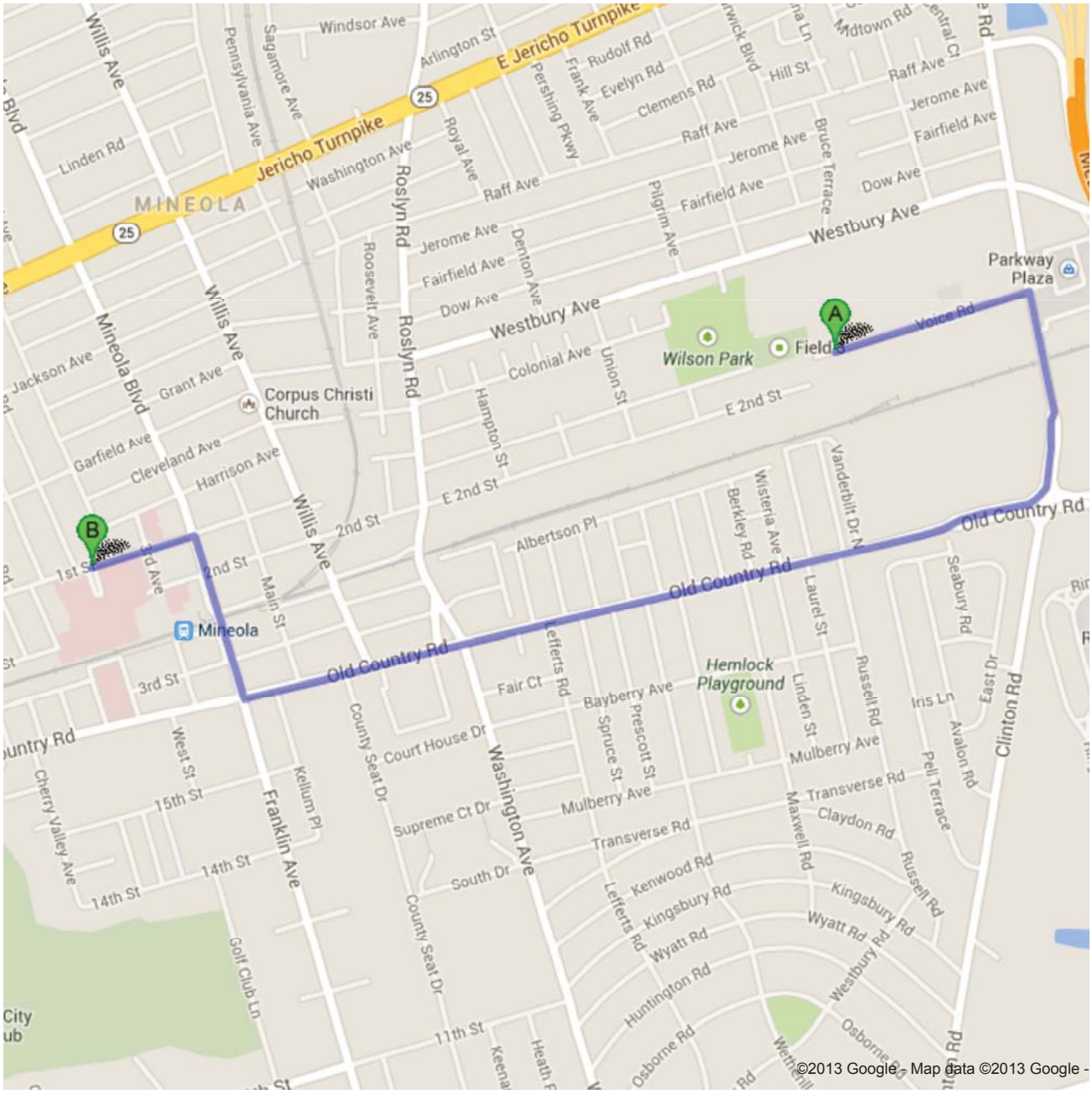
1. Head east on Voice Road toward Glen Cove Road for 0.3 mile
2. Take the first right on Glen Cove Road and proceed 0.3 mile.
3. Turn right onto Old Country Road and proceed 1.2 mile.
4. Turn right onto Mineola Boulevard and proceed 0.2 mile.
5. Take the third left onto First Street and proceed 0.2 mile.
6. Winthrop University Hospital is on the left.

Total Distance: 2.1 miles

Total Estimated Time: 6 minutes

See next page for map showing route from the site to the hospital:

Directions to Winthrop University Hospital
259 1st St, Mineola, NY 11501
2.2 mi – about **6 mins**



Attachment 7
Emergency Drill Evaluation Form

Project Name: Project Number:

Document Routing	
FSO	Retain copy in site health & safety file.

1. Basic Information

Date of the Drill: _____

Drill Facilitator: _____

Name *Signature*

2. Describe the Drill Scenario below

3. Post-drill Review

Evaluation Date: _____

a. List the Positive Attributes of the Drill below

b. List the Opportunities for Improvement below

c. List the corrective actions taken and their completion date below

Corrective Action	Assigned to…	Completion Date

Attachment 8
Site Inspection Checklist

Project Name: Project Number: Inspector/Project Role: Date/Time:

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary, and send a copy to your Regional Safety Advisor.

Instructions: Complete the applicable sections of the checklist below.

Personnel/Administrative

Observation	Yes	No	N/A	Comments
Is the HASP approved by the PIC and PM?				
Have all site workers signed the HASP?				
Are workers attending and signing daily toolbox safety meeting?				
Do employees know where the HASP is located?				
Are workers reporting unsafe acts and conditions?				
Does the HASP reflect jobs and tasks being performed at the site?				
Have all subcontractors received initial safety orientation to the site prior to beginning their work?				
Have all visitors received initial safety orientation to the site and signed the HASP?				
Are additional procedures other than the HASP required/present at the site? (examples could include lead exposure control plan, traffic plan, O&M plan for remediation systems, etc.)				

Site

Observation	Yes	No	N/A	Comments
Are MSDS'S available for each chemical at the site?				
Are flammable liquids stored away from ignition sources and in a secure place when not in use?				
Are compressed gas cylinders stored and secured properly with protective caps in place?				
Are spill kits readily available?				

Attachment 8
Site Inspection Checklist

Project Name: Project Number: Inspector/Project Role: Date/Time:

Are fire extinguishers strategically located?				
Are adequate hygiene facilities available for site workers?				
Have smoking and eating areas been established?				
Are site-specific JHAs completed and reviewed by workers?				
Do workers comply with site speed limits and traffic rules?				
Do workers comply with the cell phone policy when operating vehicles?				
Are work zones at the site properly delineated and of sufficient size?				
If work is occurring near an active road, have measures been put into place to protect against traffic?				
Have obstacles (such as holes or excavations) been guarded and signs posted warning of their presence?				
Is the work site appropriately lit?				

Housekeeping

Observation	Yes	No	N/A	Comments
Is site kept clean, neat and orderly?				
Are worker hygiene facilities, maintained and adequately stocked?				
Are warning signs in-place and legible?				
Is trash picked up regularly and properly disposed?				
Is used PPE properly disposed?				
Are containers properly labeled?				
Is there accumulated snow or ice over footpaths or roadways?				

Attachment 8
Site Inspection Checklist

Project Name: Project Number: Inspector/Project Role: Date/Time:

Have trip hazards been identified and removed or controlled?				
Are storage areas for materials orderly and maintained to avoid hazards from falling, rolling, or tripping?				
Are minimum distances maintained for flammable storage areas at the site?				

Emergency Preparedness

Observation	Yes	No	N/A	Comments
Are workers aware of the site emergency response procedures?				
Do workers know the nearest assembly point for their work area?				
Do workers know the location of the nearest eyewash/shower?				
Do workers know the location of the nearest first-aid kit				
Is there at least one first aid trained person on site at all times?				
Do workers know how to report an emergency?				
Do workers know the type of alarm used to identify an emergency or evacuation at the site?				
Has a site emergency evacuation drill been conducted?				

Work Zones

Observation	Yes	No	N/A	Comments
Are exclusion, decontamination and safe zones clearly identified and maintained?				
Are workers following proper decontamination procedures for both personnel and equipment decontamination?				
Is the decontamination station adequately stocked?				
Is the "Buddy System" adhered to?				

Attachment 8
Site Inspection Checklist

Project Name: Project Number: Inspector/Project Role: Date/Time:

Ambient Work Conditions

Observation	Yes	No	N/A	Comments
Is sufficient lighting available to safely do the work?				
If the temperature is above 85 F (29 C), are there liquids available such as Gatorade / water?				
Is there proper ventilation at the site?				
Is air monitoring data available for ambient (background) levels of chemicals at the site?				

Personal Protective Equipment (PPE)

Observation	Yes	No	N/A	Comments
Are employees aware of PPE requirements for the tasks they are performing?				
Are hardhats being worn as specified in the HASP?				
Are workers utilizing appropriate eye protection for the task, as specified in the HASP?				
Are workers utilizing the appropriate foot protection for the task, as specified in the HASP?				
Is hearing protection required and utilized?				
Are workers using and wearing the appropriate gloves/hand protection for the task, as specified in the HASP?				
Is PPE at the site maintained properly and in good condition?				

Respiratory Protection

Observation	Yes	No	N/A	Comments
Are copies of employee respiratory training records, fit tests and fit to work statements current and available on site?				
If a cartridge change-out schedule is required for the site, are workers				

Project Name: Project Number: Inspector/Project Role: Date/Time:

aware of and following it?				
Are workers performing positive and negative fit-checks when donning respirators?				
Are respirators cleaned and stored properly when not in use?				
Have exposure limits been identified for and implemented at the site?				
Are real-time air monitors kept in good condition and calibrated?				
Do employees know what to do when an exposure limit is reached?				
For sites with corrosive materials present, is an eyewash/safety shower available?				

Hand and Powered Hand Tools

Observation	Yes	No	N/A	Comments
Are all hand tools in good working order and appropriate for the task?				
Are electrical cords in good repair and inspected prior to use?				
Are external GFCI'S used and routinely inspected?				
Are guards and other safety devices present and in good working order?				
Are pneumatic hoses in good condition?				
Are fire extinguishers located nearby portable compressors or generators?				
Are generators or compressors shut down prior to fueling?				
Are ladders and/or scaffolds in good condition, properly used, and adequate for the work?				
Are malfunctioning tools tagged and taken out of service?				

Attachment 8
Site Inspection Checklist

Project Name: Project Number: Inspector/Project Role: Date/Time:

Heavy Equipment

Observation	Yes	No	N/A	Comments
Are daily equipment inspection checklists completed?				
Are safety deficiencies immediately repaired or has the equipment been taken out of service?				
Do the back-up alarms work?				
Does the operator use three-points of contact when getting on/off equipment?				
Is heavy equipment operated within its design capacity?				
Is equipment operated at safe speeds for site conditions?				
Are fire extinguishers present and in good working order on all equipment?				
Are keys or control panels removed when equipment is not in use?				
Are workers working with or near heavy equipment operations wearing high visibility clothing (i.e. traffic vest?				

Subsurface Clearance

Observation	Yes	No	N/A	Comments
Has a SSC Experienced Person been designated for the site?				
Have underground utility plans been obtained?				
Have drilling locations been scanned by CAT?				
Has hand-digging been performed as necessary in critical zones?				
Have overhead risks (power lines) been addressed?				

Attachment 8
Site Inspection Checklist

Project Name:
Project Number:
Inspector/Project Role:
Date/Time:

FOLLOW UP ITEMS:

If a checklist item was corrected in the field, please denote this in the body of the audit form in the comments section.

If a checklist item was unable to be corrected in the field, please list below the follow-up items for ERM/Client/Sub-Contractor to implement to correct the deficiency or improve the process. Be sure to assign responsibility and a due date for each item listed below.

Once completed, store a copy with your project file and send a copy to your Regional Safety Advisor.

Follow Up Items:

Attach additional comments, as necessary, to a new page.

Prepared By: _____
(print)

Reviewed By: _____
(print)

_____
(print)

Attachment 8
Site Inspection Checklist

Project Name: Project Number: Inspector/Project Role: Date/Time:

Personnel Interview Question Suggestions

Legislation	
Describe the 3 key pieces of legislation driving local ERM H&S management processes	
Give examples of how this legislation places requirements on the way we manage risk and carry out our work at ERM.	
Responsibilities and accountability	
In the event of a serious incident on a project who hold the key roles within ERM?	
How has the Partner in Charge been involved with this project?	
Communication	
Where do you go to find H&S information?	
Policies and Procedures	
What is the HASP process and what are the key requirements?	
Name 3 ERM H&S related policies/procedures in-place on this project.	
How are safety events recorded and reported at ERM?	
What process do we use to assess and manage travel related risks and what external information sources are available to you to understand risks associated with travel?	
Procedural	
Rate the performance of the PIC generally on the projects reviewed in terms of H&S	
How do rate ERM *BU*'s overall commitment to ensuring the Health and Safety of employees	
Give 2 examples of ERM's H&S systems which you think are particularly effective in protecting our staff.	

Attachment 8
Site Inspection Checklist

Project Name: Project Number: Inspector/Project Role: Date/Time:

Give 2 examples of improvements to ERM's H&S systems which you think would assist in improving performance.	
Project Audit	
Has a preliminary assessment of risks been undertaken and documented?	
Has risk assessment / HASP been reviewed, discussed and signed off by **both** PIC and PM?	
Demonstrate that H&S risks and planning have been communicated to members of the project team.	
EITHER - demonstrate that change in the project has been considered resulting in updated H&S plan ***OR*** give an example of how this might occur on *THIS* project.	
Has there been a project review including H&S? Were any lessons learned? Were any ECS events reported for this project?	
Reminders: • HASPS – level of detail, accurate information, hazard identification, management of change, signatures / review process • Emergency procedures & response – first aid, fire / evacuation • Health / welfare – facilities provided • Subcontractors / subconsultants – contract, ms/ra review, feedback • Service clearance – permits completed, management of change • Scope of work / amendments – sign off, review, who, briefing notes / communication	

TABLE A-1
SUMMARY OF CHEMICAL HAZARDS FOR CHEMICALS OF CONCERN
J&H MANUFACTURING SITE, CARLE PLACE, NEW YORK

Chemical	**Published Exposure Limit [1] (8-hour TWA [2])**	**Routes of Exposure**	**Target Organs**	**Signs/Symptoms of Exposure (Acute versus Chronic Effects)**	**First Aid &Emergency Response**
Chemical Name: **Tetrachloroethylene** CAS: 127-18-4 Vapor Pressure: 14 mm-Hg Ionization Potential: 9.32 eV	100 ppm (OSHA PEL) Carcinogen	Inhalation Skin absorption Ingestion Skin or eye contact	Eyes, skin, respiratory system, liver, kidneys, and central nervous system.	Acute: Irritation eyes, skin, nose, throat, respiratory system, nausea, dizziness Chronic: cancer, liver damage	Flush skin/eyes with water Administer artificial respiration if no breathing If ingested seek medical attention
Chemical Name: **Trichloroethene** CAS: 79-01-6 Vapor Pressure: 58 mm-Hg Ionization Potential: 9.45 eV	100 ppm (OSHA PEL) Carcinogen	Inhalation Skin absorption Ingestion Skin or eye contact	Eyes, skin, respiratory system, heart, liver, kidneys, and central nervous system.	Acute: Irritation eyes, skin, nose, throat, headache, visual disturbance, weakness, exhaustion, nausea, dizziness, vomiting Chronic: cancer, liver damage	Flush skin/eyes with water Administer artificial respiration if no breathing If ingested seek medical attention

TABLE A-1
SUMMARY OF CHEMICAL HAZARDS FOR CHEMICALS OF CONCERN
J&H MANUFACTURING SITE, CARLE PLACE, NEW YORK

Chemical	**Published Exposure Limit [1] (8-hour TWA [2])**	**Routes of Exposure**	**Target Organs**	**Signs/Symptoms of Exposure (Acute versus Chronic Effects)**	**First Aid &Emergency Response**
Chemical Name: **cis-1,2-dichloroethene** CAS: 540-59-0 Vapor Pressure: 180-265 mm-Hg Ionization Potential: 9.65 eV	200 ppm (OSHA PEL)	Inhalation Skin absorption Ingestion Skin or eye contact	Eyes, respiratory system, and central nervous system.	Acute: Irritation eyes, skin, nose, throat, CNS depression,	Flush skin/eyes with water Administer artificial respiration if no breathing If ingested seek medical attention
Chemical Name: **PAHs (aka coal tar pitch)** CAS: NA Vapor Pressure: Compound dependent Ionization Potential: Compound dependent	0.1 mg/m3 (NIOSH REL) 0.2 mg/m3 (OSHA PEL)	Inhalation Skin absorption Ingestion Skin or eye contact	Respiratory system, kidneys, skin, bladder.	Acute: dermatitis, bronchitis	Eye: Irrigate Skin: Soap wash promptly Administer artificial respiration if no breathing If ingested seek medical attention immediately

TABLE A-1
SUMMARY OF CHEMICAL HAZARDS FOR CHEMICALS OF CONCERN
J&H MANUFACTURING SITE, CARLE PLACE, NEW YORK

Chemical	**Published Exposure Limit [1] (8-hour TWA [2])**	**Routes of Exposure**	**Target Organs**	**Signs/Symptoms of Exposure (Acute versus Chronic Effects)**	**First Aid &Emergency Response**
Chemical Name: **Lead** CAS: 7439-92-1 Vapor Pressure: NA Ionization Potential: NA	0.050 mg/m3 (NIOSH REL) 0.050 mg/m3 (OSHA PEL)	Inhalation Ingestion Skin or eye contact	Eyes, gastrointestinal tract, central nervous system, blood, kidneys, gingival tissue	Acute: Lassitude, facial palor, anorexia, weight loss, malnutrition, abdominal pain, colic, anemia, paralysis of wrists/ankles.	Eye: Irrigate Skin: Soap wash promptly Administer artificial respiration if no breathing If ingested seek medical attention immediately

NOTES:

1. The most conservative published occupational exposure limit is listed. Sources for occupational exposure limits were OSHA and ACGIH.
2. OSHA PEL = Occupational Safety and Health Administration Permissible Exposure Limit
3. PPM = parts contaminant per million parts air (by volume)
4. All PAHs are categorized by OSHA under “Coal Tar Pitch”, all with the same PEL

Sources of information include published exposure limits in 29 CFR 1910.1000 or the 2002 TLV Booklet published by ACGIH, NIOSH pocket guide, Chemical/Physical Properties from Texas Risk Reduction Program, International Chemical Safety Cards, MSDSs, and the HNU listing of Photoionization Characteristics of Selected Compounds.

TABLE A-2
ADDITIONAL CHEMICAL HAZARD DATA FOR NON-VOLATILE COCs (METALS, PAHs)
J&H MANUFACTURING SITE, CARLE PLACE, NEW YORK

Chemical	**Maximum Concentration in Site Soil/Sediment (mg/kg)**	**OSHA PEL or NIOSH REL (mg/m^3)**	**Airborne Chemical Concentration in 5.0 mg/m^3 of dust (mg/m^3)**
Mercury	0.89	0.01	4.45E-06
Lead	255	0.05	1.28E-03
Benzo(a)anthracene	5.8	0.1	2.90E-05
Benzo(a)pyrene	8.5	0.1	4.25E-05
Benzo(b)flouranthene	10.8	0.1	5.40E-05
Benzo(k)flouranthene	10.8	0.1	5.40E-05
Chrysene	12.1	0.1	6.05E-05
Dibenz(a,h)anthracene	1.6	0.1	8.00E-06
Fluoranthene	Not Detected	0.1	NA
Indeno(1,2,3-c,d)pyrene	4.5	0.1	2.25E-05
Pyrene	Not Detected	0.1	NA

NOTES:

1. The most conservative published occupational exposure limit is listed. Sources for occupational exposure limits were OSHA and ACGIH.
2. OSHA PEL = Occupational Safety and Health Administration Permissible Exposure Limit
3. All PAHs are categorized by OSHA under “Coal Tar Pitch”, all with the same PEL and REL

Sources of information include published exposure limits in 29 CFR 1910.1000 or the 2002 TLV Booklet published by ACGIH, NIOSH pocket guide, Chemical/Physical Properties from Texas Risk Reduction Program, International Chemical Safety Cards, MSDSs, and the HNU listing of Photoionization Characteristics of Selected Compounds.

TABLE A-3
SUMMARY OF CHEMICAL HAZARDS FOR CHEMICALS ROUTINELY USED BY ERM
J&H MANUFACTURING SITE, CARLE PLACE, NEW YORK

Chemical	**Exposure Limit (1) (8-hr TWA (2))**	**Routes of Exposure**	**Target Organs**	**Signs/Symptoms of Exposure (Acute versus Chronic Effects)**	**First Aid & Emergency Response**
Chemical Name: **Portland Cement** Vapor Pressure: N/A, solid Ionization Potential: N/A, solid	10 mg/m^3 (ACGIH TLV)	Inhalation Skin contact Ingestion	Eyes, skin, respiratory system	Acute Irritation of eyes, skin and respiratory system; skin burns Chronic Contains trace amounts of crystalline silica which cause silicosis and may be carcinogenic	Flush eyes/skin with water Administer artificial respiration if not breathing Seek medical attention immediately if ingested
Chemical Name: **Bentonite** Vapor Pressure: N/A, solid Ionization Potential: N/A, solid	0.05 mg/m^3 (ACGIH TLV for crystalline silica)	Inhalation Skin contact Ingestion	Eyes, skin, respiratory system	Acute Irritation of eyes, skin and respiratory system Chronic Contains trace amounts of crystalline silica which may cause silicosis; potential carcinogenic	Flush eyes/skin with water Administer artificial respiration if not breathing Seek medical attention immediately if ingested
Chemical Name: **Silica sand** Vapor Pressure: N/A, solid Ionization Potential: N/A, solid	0.05 mg/m^3 (ACGIH TLV)	Inhalation Skin contact Ingestion	Eyes, respiratory system	Acute Irritation of eyes; coughing Chronic Silicosis; lung carcinogen	Flush eyes with water Move to fresh air Seek medical attention

TABLE A-3
SUMMARY OF CHEMICAL HAZARDS FOR CHEMICALS ROUTINELY USED BY ERM
J&H MANUFACTURING SITE, CARLE PLACE, NEW YORK

Chemical	**Exposure Limit (1) (8-hr TWA (2))**	**Routes of Exposure**	**Target Organs**	**Signs/Symptoms of Exposure (Acute versus Chronic Effects)**	**First Aid & Emergency Response**
Chemical Name: **Isobutylene Balance Air** CAS: N/A, mixture Vapor Pressure: N/A, gas at ambient conditions Ionization Potential: N/A, mixture	None established	Inhalation	Respiratory system	Acute: Simple asphyxiant, difficulty breathing, cyanosis, rapid pulse, impairment of senses, mental disturbances, and convulsions Chronic: None known	Move to fresh air, administer artificial respiration if not breathing See medical attention

NOTES:

1. The most conservative published occupational exposure limit is listed. Sources for occupational exposure limits were OSHA and ACGIH.
2. TWA = time weighted average
3. mg/m^3 = milligrams of contaminant per cubic meter of air
4. ACGIH TLV = American Conference of Governmental Industrial Hygienists Threshold Limit Value
5. ppm = parts of contaminant per million parts of air
6. OSHA PEL = Occupational Safety and Health Administration Permissible Exposure Limit

Sources of information include published exposure limits in 29 CFR 1910.1000 or the 2002 TLV Booklet published by ACGIH, NIOSH pocket guide, Chemical/Physical Properties from Texas Risk Reduction Program, International Chemical Safety Cards, MSDSs, and the HNU listing of Photoionization Characteristics of Selected Compounds.

TABLE A-4
ACTION LEVELS
J&H MANUFACTURING SITE, CARLE PLACE, NEW YORK

Contaminant	***Action Level (units)****	***Monitoring Instrument***
Dust	5.0 (mg/m^3)	MIE DR 1000 Personal Data RAM Aerosol Monitor
TVOC Concentration (ppm)	5.0 ppm (TWA) in breathing zone	Photovac PID with 11.6 eV lamp or, MiniRae 2000 with 11.6 eV lamp or, Flame ionization detector

* For upgrading from Level D to Level C personal protective equipment (PPE) or stopping work to consider other potential controls.

TABLE A-5
SITE-SPECIFIC AND TASK-SPECIFIC HAZARDS AND CONTROL STRATEGIES
J&H MANUFACTURING SITE, CARLE PLACE, NEW YORK

Task/Activity	***Hazards***	***Control Strategy***
All activities at site Level D PPE	Poisonous plants	• Identify suspect plants • Wash exposed body parts and equipment thoroughly after work in highly-vegetated areas
	Non-stinging insects	• Insect repellant
	Stinging insects	• Survey work area for presence of nests • Eliminate nests
	Thunder/Lightning	• If drilling, cease work following first indication of thunder/lightning • Shelter in buildings or vehicles not underneath trees or near drilling equipment • Begin work after 15 minutes has elapsed from last thunder/lightning
	Cold Stress	• Appropriate clothing • Frequent short breaks in warm dry shelter as needed
	Slip/Trip/Fall	• Awareness of surroundings and footing • Survey areas for snow and ice
Drilling	Heavy equipment movement	• Personnel maintain eye contact with operators when near the rig.
	Dropped equipment, slip, trip or fall.	• Hard hats, steel-toe safety shoes and safety glasses worn during equipment operation.
	Noise	• Hearing protectors with proper noise reduction rating.
Completion, development, and sampling of groundwater well	Splashing of contaminated groundwater	• Safety glasses; chemical-resistant suits (as determined necessary by SSO)

TABLE A-6
PERSONAL PROTECTION EQUIPMENT REQUIREMENTS
J&H MANUFACTURING SITE, CARLE PLACE, NEW YORK

PPE Level	Ensemble Components	Anticipated Use
Level D Should be worn only as a work uniform and not in any area with respiratory or skin hazards. It provides minimal protection against chemical hazards.	• Long pants and shirt with sleeves • Steel-toed footwear • Safety glasses with molded side shields or goggles. • Hard hat if potential for head injury or falling debris is possible/or client requirement • General purpose work gloves if task does not involve water or wet materials • Hearing protection • High visibility traffic vest when in traffic areas	All activities unless otherwise directed by the SSO, PM, and Project Manager and Project Health and Safety Coordinator .
Modified Level D	Level D and the following: • Disposal Tyvek coveralls • Steel-toed rubber boots or disposal boot covers over shoes • Thin nitrile gloves • Green nitrile gloves over thin nitrile gloves when primary gloves may tear or puncture	Any of the above-referenced tasks in which there is moderate potential for skin contact
Level C Should be worn when the criteria for using air-purifying respirators are met, and a lesser level of skin protection is needed.	Level D or Modified Level D and the following: • Half-face air purifying respirator with combination organic vapor/high efficiency particular air (HEPA) cartridges	Any of the above-referenced tasks in which there is moderate potential for skin contact with constituents and data indicating need for respiratory protection. No upgrade to Level C without approval from Project Manager and Project Health and Safety Coordinator
Level B Should be worn when the highest level of respiratory protection is needed, but a lesser level of skin protection is needed.	Not anticipated to be required	Tasks requiring Level B PPE are not anticipated during this project. If Level B PPE is needed, as determined by the SSO and/or the Project Health and Safety Consultant, the HASP will be revised.
Level A Should be worn when the highest level of respiratory, skin, and eye protection is needed.	Not anticipated to be required	Tasks requiring Level A PPE are not anticipated during this project. If Level A PPE is needed, as determined by the SSO and/or the Project Health and Safety Consultant, the HASP will be revised

Appendix G

Health & Safety Plan

Site Specific
Health and Safety Plan

J&H Manufacturing
Carle Place, New York

October 2013

Prepared by:

ENVIRONMENTAL RESOURCES MANAGEMENT
105 Maxess Road, Suite 316
Melville, New York 11747

TABLE OF CONTENTS

ATTACHMENTS

SAFE WORK PRACTICES & JOB HAZARD ANALYSES (INCLUDED AS ATTACHMENT 1)

A.0 SITE SPECIFIC HEALTH AND SAFETY PLAN (HASP)

A.1 INTRODUCTION

This Health and Safety Plan (HASP) has been developed by ERM for the Implementation of the Site Wide Remedial Action Work Plan (RAWP) of the J&H Manufacturing Site in Carle Place, NY. The procedures set forth in this HASP are designed to reduce the risk of exposure to chemical substances and physical or other hazards that may be present. The procedures described herein were developed in accordance with OSHA 29 CFR 1910.120 Hazardous Waste Operations and Emergency Response, U.S. Dept. of Labor, OSHA.

The recommended health and safety guidelines within this HASP will be modified if future information changes the activities to be performed or the characterization of the area in which work is to be performed.

A.1.1 Health and Safety Policy Statement

ERM developed the following Health and Safety Plan (HASP) for use by ERM personnel and by ERM contractors (individually, an "ERM Contractor" and collectively, "ERM Contractors"). ERM personnel must adhere to the practices and procedures specified in the HASP. Each ERM Contractor must review the HASP and agree to accept and abide by the HASP, subject to any modifications to the HASP (to address the ERM Contractor's more stringent practices and procedures) agreed upon in writing by ERM and the ERM Contractor. The ERM Contractor shall indicate such acceptance by signing this document prior to commencing work at the Site. However, if any ERM Contractor commences work at the Site, the ERM Contractor shall be deemed to have accepted the HASP and the terms hereof and the failure to execute and return to ERM a copy of this notice shall not be relevant to such interpretation.

If a contractor or a person other than the Client, ERM employees and ERM Contractors (individually, a "Third Party" and collectively, "Third Parties") receives a copy of the HASP, such Third Party should not assume that the HASP is appropriate for the activities being conducted by the Third Party.

NO THIRD PARTY HAS THE RIGHT TO RELY ON THE HASP. EACH THIRD PARTY SHOULD ABIDE BY ITS OWN SITE-SPECIFIC HEALTH AND SAFETY PLAN IN ACCORDANCE WITH ITS OWN PROFESSIONAL JUDGMENT AND ESTABLISHED PRACTICES.

ERM shall not be responsible for the implementation of any Third Party safety program(s), except to the extent otherwise expressly agreed upon

by ERM and a Third Party in writing. The services performed by ERM for the Client and any right of the client and/or an ERM Contractor to rely on the HASP shall in no way inure to the benefit of any Third Party, including, but not limited to, employees, agents, or consultants and subcontractors of ERM Contractors, so as to give rise to any cause of action by such Third Party against ERM.

The HASP generated by ERM in connection with the Project is for use on a specific site and in connection with a specific project. ERM makes no representation or warranty as to the suitability of the HASP for reuse on another site or as to the suitability of the HASP for reuse on another project or for modifications made by the Client or a Third Party to the HASP.

All entrants to portions of the jobsite controlled by ERM must sign the HASP. Signing below certifies understanding and willingness to comply with the contents of this HASP. ERM has prepared this plan solely for the purpose of protecting the health and safety of ERM employees. Subcontractors, visitors, and others at the site are required to follow provisions in this document at a minimum, but must refer to their organization's health and safety program for their protection.

Printed Name	Signature	Company	Date

A.2 ERM PROJECT PERSONNEL AND RESPONSIBILITIES

ERM Project Director (PD) Michael Teetsel
Overall project responsibility; conducts ultimate Quality Assurance/Quality Control (QA/QC) review.

ERM Project Manager (PM): John Mohlin, P.E.
Manages day-to-day activities; reports to PD.

ERM Project Health and Safety Coordinator: Matt Boardman
Directs development of HASP; provides technical advice on health and safety issues.

ERM Site Safety Officer (SSO): Brice Lynch
Responsible for implementation of HASP; reports to PD. The SSO (or his substitute) will meet all applicable ERM training requirements.

A.3 FIELD ACTIVITIES

The objective of the Site Wide RAWP is to remove subsurface soil contamination from four AOCs, AOC 1, AOC 4, AOC 5, & AOC 9 and continue operating the existing sub-slab depressurization system currently on site. See ERM Remedial Action Work Plan, October 2013, for the full scope of work. A summary of these activities are provided below:

- Remedial Mobilization
- Excavation of Contaminated soils
- Vacuum removal of soil from dry wells
- Off-site soil transportation and disposal
- Confirmation Soil Sampling
- Health & Safety and air monitoring
- Operation of sub-slab depressurization system
- Groundwater sampling
- Site restoration

A.4 HAZARD IDENTIFICATION and CONTROL

A.4.1 Hazard Identification Process

Prior to initiating any new project activity or when there is a change in site conditions, the Site Safety Officer (SSO) will assist project team members in completing a Job Hazard Analysis (JHA). A copy of the JHA form is located in Attachment 1, as well as JSAs applicable to this work. The selected subcontractor will be required to provide similar JSAs for its work tasks.

A.4.2 Chemical Hazards

Chemicals may be introduced into the body by ingestion, inhalation, or absorption through the skin. Since not all chemicals have the same level of toxicity, the length of time for the exposure and the concentration of the chemical are important in determining the risk. Inhalation and skin contact are the most common routes of entry. Chemicals can be introduced into the body by ingestion when chemicals present on the hands are transferred to food or cigarettes.

Based on historical soil and groundwater sampling, the chemicals of concern that may be encountered at the site are listed as follows:

- Benzo(a)anthracene
- Benzo(a)pyrene
- Benzo(b)fluoranthene
- Chrysene
- Dibenzo(a,h)anthracene
- Indeno(1,2,3-cd)
- PCE
- TCE
- cis-1,2-DCE

The pertinent health and safety information regarding these substances is provided in Tables A-1 and A-2. Note that among the metals that have been detected in Site soil, lead was detected at the highest concentrations and is therefore assumed to represent the worst-case risk for metals exposure. Safety data for other substances that may be used on the project are proved in Table A-3.

A.4.3 Ambient Air Monitoring

Ambient air monitoring will be conducted in the work zone by ERM during all intrusive field activities under the supervision of the SSO. This monitoring will be conducted using direct-reading real-time instruments as indicated in Table A-4. This table also provides action levels for upgrading the level of personal protective equipment (PPE) from Level D to Level C. Alternatively, work in Level D PPE may be stopped and alternate controls may be instituted, if appropriate. A summary of the action levels is provided below:

- Volatile Organic Compounds (VOCs) – Action level shall be 5.0 ppmv as measured by a Photovac photoionization detector (PID) with an 11.6 eV bulb or a flame ionization detector (FID). Monitoring for VOCs will only be conducted in areas where VOCs have been detected. At this time, no remedial excavation work is planned in any areas with known VOCs.
- Respirable Dust – Action level shall be 5.0 mg/m^3 as measured by a MIE DR 1000 Personal Data RAM Aerosol Monitor. This action level is also adequately protective with respect to non-volatile chemicals (PAHs and metals) that may be present in site soil (see Table A-2).

Direct reading instrumentation will be calibrated daily per manufacturer's instructions. Cylinders of the appropriate calibration gas will be required for fieldwork lasting longer than one day.

Additional air monitoring will be conducted on the work zone perimeter (upwind and downwind) as per the New York State Department of Health (NYSDOH) Generic Community Air Monitoring Plan (CAMP). The NYSDOH CAMP is provided as Attachment 3. Additional monitoring might also be conducted under any of the following circumstances.

- Work begins on a new portion of the site.
- Change in job tasks.
- Change in weather.
- Change in ambient levels of hazardous constituents as indicated by the sense of smell or changes in the physical appearance of the soil or groundwater.
- When new hazardous substances are encountered.

A.4.4 Site-Specific and Task-Specific Hazards and Control Strategies

The hazards and control strategies associated with planned work activities

are summarized in Table A-5. During the mobilization phase of a specific work task, the project team can quickly review the hazards and control strategies by locating the task or activity to be performed on the table. Hazards that are common to all activities performed at the site are listed first. The hazards listed for a particular task or activity includes the common hazards.

Some construction activities may be conducted within the Site building. This work will be curtained off from the remainder of the indoor space and vented to the exterior if necessary. Ambient air monitoring will be conducted both inside and outside the curtain as described above in Section A.4.3. Should exceedances of the listed action levels be detected outside the curtain, work at that location will be temporarily halted until appropriate controls are put in place so that the job can be completed safely, without unacceptable exposures to plant workers.

A.5 PERSONAL PROTECTIVE EQUIPMENT

The level of PPE selected for a task is based on the following:

- Type and measured concentration of the chemical substance in the ambient atmosphere and its toxicity.
- Potential for exposure to substances in air, splashes of liquids or other direct contact with material due to work being done.
- Knowledge of chemicals on-site along with properties such as toxicity, route of exposure, and contaminant matrix.

In situations where the type of chemical, concentration, and possibilities of contact are not known, the appropriate level of protection must be selected based on professional experience and judgment until the hazards can be better identified.

In addition to summarizing the general PPE requirements for tasks performed at the site, Table A-6 also serves as the written certification that the PPE Hazard Assessment has been conducted.

A.5.1 Respiratory Protection

The type of respiratory protection required will be based on the results of ambient air monitoring described above in Section A.4.3 and the professional judgment of the SSO and the Project Health and Safety Coordinator.

As required by 29 CFR 1910.134, *Respiratory Protection*, a cartridge change-

out schedule will be developed if it is necessary to upgrade to Level C based on either the results of ambient air monitoring, the results of any models used to predict ambient air concentration; or the professional judgment of the Project Health and Safety Coordinator. At a minimum, new respirator cartridges must be placed on the respirator at the beginning of the shift and after lunch, and this will be documented in the daily logs.

A.6 HEAT AND COLD STRESS

A.6.1 Heat Stress

The timing of these activities may be such that heat stress may pose a threat to the health and safety of Site personnel. Acclimation periods and work/rest regimens will be implemented as necessary so that personnel do not suffer adverse effects from heat stress. Heat stress, if necessary, will be monitored in accordance with the American Conference of Governmental and Industrial Hygienists (ACGIH) Threshold Limit Values (TLV) for Heat Stress or equivalent when the temperature is greater than 80°F. The following work/rest regimen will be utilized:

Temp °F	*Work-Rest Regimen*
80	Work Break Every 2 hours.
82	75% Work – 25% Rest, each hour.
85	50% Work – 50% Rest, each hour.
88	25% Work – 75% Rest, each hour.
90	Delay work until cooler temperatures prevail.

Special clothing and an appropriate diet and fluid intake will be recommended for all Site personnel to further reduce these temperature-related hazards. A good rule of thumb to prevent dehydration from heat stress is that fluid intake should equal fluid loss from the body, which can be accomplished through frequent small intakes of water. Potable water and/or a drink substitute (i.e., Gatorade) will be available for employee consumption.

A.6.2 Cold Stress

The timing of investigative or remediation activities may be such that cold stress may also present a threat to the health and safety of Site employees. Work/rest schedules, with rest in a warming shelter, will be implemented as necessary to reduce adverse effects from cold exposure. Cold stress, if necessary, will be monitored in accordance with the ACGIH TLV for Cold

Stress or equivalent. The addition of wind speed and the resulting wind chill will be considered when determining an appropriate work/rest schedule and appropriate clothing.

Site personnel will be encouraged to consume water to avoid dehydration. Potable water and/or a drink substitute (i.e., Gatorade) shall be available for employee consumption. Workers will wear adequately insulated clothing to limit exposure to cold.

A.7 SAFE WORK PRACTICES AND STANDARD OPERATING PROCEDURES

A.7.1 General Site Provisions

A.7.1.1 Smoking and Eating Areas

Smoking will only be allowed in designated areas. Upon mobilization at the site, the SSO will establish smoking areas per site-specific or client-specific requirements. Individuals caught smoking outside the designated smoking areas will be subject to disciplinary action up to and including immediate termination.

Upon mobilization at the site, the SSO will establish eating and break areas per site-specific or client-specific requirements. Eating will only be allowed in the designated areas and the areas will be maintained in a clean and sanitary condition.

A.7.1.2 Temporary Facilities

This project will not require any temporary facilities.

A.7.1.3 Standard Operating Procedures

The following standard operating procedures will be adhered to at all times.

- All personnel entering the site must check in with the SSO.
- All individuals entering the site must demonstrate to the SSO that they have been adequately trained as defined in Section 10.
- All individuals must be familiar with emergency communication methods and how to summon emergency assistance.
- Use of alcoholic beverages before, during operations, or immediately after hours is absolutely forbidden. Alcohol can reduce the ability to detoxify compounds absorbed into the body as the result of minor

exposures and may have negative effects with exposure to other chemicals. In addition, alcoholic beverages will dehydrate the body and intensify the effects of heat stress.

- Horseplay of any type is forbidden.
- All unsafe conditions will be immediately reported to the SSO, who will document such conditions in the field log. The SSO will be responsible for ensuring that the unsafe condition is correctly as quickly as possible.
- Smoking, matches, and lighters are only allowed in the designated smoking area.
- Avoid contact with potentially contaminated substances. Avoid, whenever possible, kneeling on the ground, or leaning or sitting on trucks, equipment or the ground. Do not place equipment on potentially contaminated surfaces.

A.7.2 Safe Work Practices

A.7.2.1 Ergonomics

Ergonomic risk factors include repetitive motion, force, awkward posture, and vibration. The key to preventing ergonomic injuries is education of personnel relative to the hazards and risk factors and implementation of proper controls and work practices.

Several tasks associated with this project have the potential to cause back injuries, if proper lifting techniques are not followed. Site workers should not lift objects that are beyond their physical capabilities and the use of mechanical devices such as forklifts is encouraged. In addition, when shoveling, site workers should not twist their backs while moving materials with the shovel. The proper technique is to move the feet.

Proper lifting techniques are summarized below.

- Place feet shoulder width apart with toes pointing slightly out.
- Bend at your knees keeping back straight.
- Get a good grip on the object and pull object close to your body.
- Tighten abdominal muscles.
- Keep your head up, looking forward, and lift with your legs while maintaining a straight back.
- Keep load close to your body and ensure your view is not obstructed.

- If one end of the load is heavier than the other, the heavier end should be closest to your body.
- Move your feet to relocate the object as opposed to twisting your back.
- When placing the object down, bend your knees and use your leg muscles while keeping your back straight.

A.7.2.2 Pre-Drilling/Pre-Excavation and Probing Protocol

Prior to mobilizing to the field, the Project Manager will be responsible for ensuring the following issues have been adequately addressed:

- Contacting One-Call or equivalent to identify underground pipelines, utility lines, and fiber optic cable.
- Contacting appropriate municipality to identify underground and sewer lines.
- Contacting posted pipeline companies.
- Request that the Site Operator markout existing subsurface utilities in the work areas.
- If necessary, engage a subcontractor to perform further markouts, as necessary to ensure safe work conditions.
- Complete Subsurface Clearance Location Disturbance Permit (Attachment 2)
- Complete a Subsurface Clearance Location Disturbance Permit and submit to the Partner-in-Charge (PIC) for approval (Attachment 2)
- Complete Excavation Safety Checklist

A.7.2.3 Fall Protection

This project does not involve working from heights more than six feet above grade.

A.7.2.4 Weather Related Events

Weather related events that may impact fieldwork include, but are not limited to, rain, snow, thunder, and lightning. The SSO will be responsible for determining what site work can be performed safely in the rain and at what point work will cease due to either quality or safety issues. In the event of thunder and/or lightning, all work will be suspended until 15 minutes have elapsed from the last clap of thunder or flash of lightning.

During rain, lightning and/or thunder events, site workers should seek shelter in either a building or vehicle.

A.7.2.5 Night Work

Adequate lighting shall be installed for any activities being performed at night. All time-of-day specific noise limits will be maintained at property boundaries.

A.7.2.6 Noise

Employees performing any noisy task, such as but not limited to, operating heavy equipment, drilling, using power tools, or employees working within 20 feet of the person performing the task will wear hearing protection consisting of either earplugs or earmuffs. Personnel operating a drilling rig or standing within 20 feet of a drilling rig during operation will also wear hearing protection.

A.8 EMPLOYEE TRAINING

All employees and subcontractors working on-site, who may be exposed to hazardous substances, health hazards, or safety hazards and their supervisors and management responsible for the site will receive training meeting the requirements of 29 CFR 1910.120, *Hazardous Waste Operations and Emergency Response* (HAZWOPER) before they are permitted to engage in any job task. Employees will not be permitted to participate in or supervise field activities until they have been trained to a level required by their job function and responsibility. Once on-site, all site workers will receive training covering at a minimum the following.

- Names of personnel and alternates responsible for site safety and health;
- Safety, health and other hazards present on the site;
- Use of PPE;
- Safe use of engineering controls and equipment on the site; and
- Medical surveillance requirements including recognition of symptoms and signs that might indicate overexposure to hazards.

A.8.1 Subcontractor Training

The SSO will verify that subcontractor personnel have received all

appropriate training as required by this HASP prior to their arriving on-site. Verification will consist of reviewing written training documentation such as copies of training certificates or cards. Copies of the written training documentation will be retained in the project file. Subcontractor personnel will not be allowed to work at the site unless said training documentation is available. All subcontractors will be approved in ERM's subcontractor prequalification database – PICS Auditing.

A.8.2 Medical Surveillance

All ERM employees are enrolled in a medical surveillance program. All employees receive an initial medical examination and consultation prior to assignment to any job site. In addition, employees receive an annual or biennial medical examination, a medical examination upon termination of employment, and a medical examination when the employee exhibits signs or symptoms relating to possible overexposure to hazardous substances or when an injury or exposure above published exposure limits has occurred in an emergency situation.

Additional medical surveillance should be provided for employees who:

- Are or may be exposed to hazardous substances or health hazards at or above published exposure levels for these substances for 30 days or more a year;
- Wear a respirator for 30 days or more a year or as required by 29 CFR 1910.134, *Respiratory Protection*; and
- Are injured, become ill or develop signs or symptoms due to possible overexposure involving hazardous substances or health hazards from an emergency response or hazardous waste operation.

A.8.3 Daily Tailgate Safety Meeting

A tailgate safety meeting will be conducted each morning. The daily safety meeting meetings will include awareness concerns such as special concerns regarding health and safety, pollution prevention or a discussion of recent incidents or safety observations. Issues such as any changes to the HASP will be addressed daily. The meetings will include a discussion of what tasks will be completed that day and how those tasks will be conducted safely. The meetings will be documented on the Daily Safety Meeting form found in Attachment 4.

A.9 SITE CONTROL MEASURES

The drilling location and surrounding area will be considered the work zone. Drilling will take place in different areas and new work zones will be delineated by the SSO as the drill rig is moved and during monitoring well sampling. The work area will be delineated using traffic cones and/or "Caution" tape. The SSO will ensure that no one enters the work zone without the proper training and requirements. All personnel entering the Work Zone will sign the project sign-in sheet in Attachment 5. Furthermore, all ERM personnel and subcontractor will sign-in at the start of each workday and sign out at the end of each workday.

A.10 DECONTAMINATION PROCEDURES

Decontamination involves the orderly controlled removal of contaminants from both personnel and equipment. The purpose of decontamination procedures is to prevent the spreading of contaminated materials into uncontaminated areas. All site personnel should limit contact with contaminated soil, groundwater or equipment in order to reduce the need for extensive decontamination.

A.10.1 Personnel Decontamination

The following decontamination procedures will be utilized:

- Clean rubber boots with water.
- Remove all PPE and dispose of the PPE in the designated drums.
- Wash hands and any skin that may have come in contact with affected soil or groundwater with moistened disposable towels, such as baby wipes, or soap and water.

A.10.2 Equipment Decontamination

All drilling equipment and the back of the drilling rig shall be decontaminated by steam cleaning prior to performance of the first boring/well installation and between all subsequent borings/well installations. This shall include all hand tools, casing, augers, drill rods and bits, tremie pipe and other related tools and equipment. The steam cleaning equipment shall be capable of generating live steam with a minimum temperature of 212^{o} degrees Fahrenheit. The equipment shall be cleaned to the satisfaction of the ERM's hydrogeologist.

A.11 CONFINED SPACE ENTRY PROCEDURES

Entry into permit-required confined spaces is not anticipated or

permitted.

A.12 SPILL CONTAINMENT PROGRAM

The project activities involve the use of drums or other containers, the drums or containers will meet the appropriate DOT regulations and will be inspected and their integrity assured prior to being moved. Operations will be organized so as to minimize drum or container movement. Drums or containers that cannot be moved without failure will be over packed into an appropriate container.

A.12.1 Hydraulic Fluid/Engine Oil/Fuel Spills

In the event of an unexpected release of hydraulic fluid, engine oil, gasoline or diesel fuel, the release material will be absorbed with sorbent pads, which will be placed in a designated drum for disposal. Impacted soil will be excavated and placed on plastic sheeting and covered until characterization and/or disposal can be arranged.

A.13 SITE COMMUNICATION

Cell phones will be used for communication between the project team and the client and office.

A.14 COMMUNICATION AND REVIEW OF SITE-SPECIFIC HEALTH AND SAFETY PLAN

An initial review of the site-specific HASP will be held either prior to mobilization or after mobilization but prior to commencing work at the site to communicate HASP details and answer questions to individuals working at the site. Daily tailgate safety meetings will be held each morning to review work practices for the day and to discuss safety issues. Any new hazard or safety information will be disseminated at the daily tailgate safety meeting or as needed throughout the day.

A.15 EMERGENCY RESPONSE PLAN

This section describes possible contingencies and emergency procedures to be implemented at the site.

A.15.1 Personnel Roles and Lines of Authority

The SSO has primary responsibility for site evacuation and notification in the event of an emergency situation. This includes taking appropriate measures to ensure the safety of site personnel and the public. Possible

actions may involve the evacuation of personnel from the site area and ensuring that corrective measures have been implemented, appropriate authorities notified, and follow-up reports completed. If the SSO is not available, the ERM Project Geologist/Engineer will assume these responsibilities. Subcontractors will assist the SSO within the parameters of their scope of work.

A.15.2 Emergency Alarms

Because of the small work area and mobility of work areas, an emergency evacuation plan and meeting place will decide on the drilling or sampling locations.

A.15.3 Reporting Emergencies

All, including any late developing or aggravated injuries, must receive prompt medical attention. Immediately after the initial response to the incident is made (securing the scene, contacting emergency responders, or administering first aid), contact WorkCare at 1-888-449-7787 for medical advice.

The SSO is responsible for reporting all injuries, illnesses, fires, spills/releases, property damage or near misses. At the earliest time practicable following the occurrence of the emergency situation, the following individuals will be contacted:

- Injured/involved employee's supervisor;
- ERM Project Manager;
- ERM Partner-In-Charge;
- ERM Project Health and Safety Consultant; and
- Client Contact.

A.15.4 Emergency Contacts

In case of an emergency, the SSO will contact the following as appropriate.

TITLE/NAME	*PHONE NUMBERS*
ERM Project Director Michael B. Teetsel, C.P.G	Work: 802-767-9604 Mobile 860-324-6207
Project Manager John Mohlin, P.E.	Work: 631-756-8931 Mobile 516-315-6872
Site Safety Officer Brice Lynch	Work: 631-756-8931 Mobile 631-219-6819

TITLE/NAME	*PHONE NUMBERS*
Project Geologist/Engineer TBD	Work: 631-756-8900 Mobile: TBD
Project Health and Safety Coordinator Paulina Gravier	Work: 212-447-1900 Mobile: 917-664-2590
Mr. Girish Desai, P.E. NYSDEC	Work: 631-444-0243
Local Emergency Responders – all services	Phone: 911
Hospital: Winthrop University Hospital 259 1st Ave. Mineola, NY	Phone: 516-663-0333

A.15.5 Incident Investigations

Safety events are occurrences or conditions that may contribute to or result in an injury, occupational illness or property damage. ERM seeks to learn from the investigation of the following types of safety events:

- Unsafe acts and unsafe conditions,
- Near misses, and
- Incidents (injury, illness, property damage, fire, or chemical spill).

All safety events must be reported promptly. Immediate verbal notification to the project PM and PIC is required, as well as entry of the event into the Event Communication System (ECS), ERM's electronic safety event reporting system within 48 hours of the safety event occurring.

A.15.6 Directions to Nearest Hospital

The nearest hospital is *Winthrop University Hospital.* A map and directions to this facility are located in Attachment 6.

Winthrop University Hospital
259 1st Avenue – Mineola, NY
516-663-0333

A.15.7 Emergency Drills

In accordance with the HAZWOPER Standard emergency response plans will be rehearsed regularly as part of the overall training program for site operations. The frequency of this drill (rehearsal) is outlined below:

PROJECT DURATION	*DRILL FREQUENCY*
Less than 30 days	None, cover during review and sign-off of HASP
Greater than one month, less than one year	Once
Greater than one year	Annually

All drills will be documented in the field book. Drills do not need to be elaborate. A tabletop scenario during the daily safety meeting is an adequate drill.

A.16 SAFETY EQUIPMENT

A first aid kit containing first aid items for minor incidents only and a fire extinguisher is maintained in each ERM Northeast vehicle. If you are driving a personal vehicle or a rental vehicle, please rent a first aid kit and fire extinguisher from the equipment room.

Attachment 1

Safe Work Practices & Job Hazard Analyses

	SAFE WORK PRACTICE	
ERM	SOP #:	1
	Title:	Hazard Communication
	Last Rev.:	1/12/2011
	Page:	1 of 3

SCOPE

This procedure provides guidance on meeting regulatory requirements and ensuring that the information necessary for the safe use, handling and storage of hazardous chemicals is provided and made available to employees.

DEFINITIONS

- **Hazardous Chemical –** Any chemical which is a physical hazard or a health hazard.

- **Hazard Warning –** Any words, pictures, symbols, or combination thereof appearing on a label or other appropriate form of warning which convey the specific physical and health hazard(s), including target organ effects, of the chemical(s) in the container(s).

- **Health Hazard –** A chemical for which there is statistically significant evidence based on at least one study conducted in accordance with established scientific principles that acute or chronic health effects may occur in exposed employees. The term "health hazard" includes chemicals that are carcinogens, toxic or highly toxic agents, reproductive toxins, irritants, corrosives, sensitizers, hepatotoxins, nephrotoxins, neurotoxins, agents that act on the hematopoietic system, and agents which damage the lungs, skin, eyes, or mucous membranes.

- **Physical Hazard –** A chemical for which there is scientifically valid evidence that it is a combustible liquid, a compressed gas, explosive, flammable, an organic peroxide, an oxidizer, pyrophoric, unstable (reactive) or water-reactive.

PROCEDURE

A. The Field Safety Officer will develop a chemical inventory of all known chemicals to be used or present as a potential contaminant at the job site.

B. The Field Safety Officer will ensure that all containers (drums, bottles, etc.) are labeled with the identity of the known hazardous chemical contained and any appropriate hazard warnings. Containers that are not labeled or where labels have faded or been removed will be relabeled immediately.

C. The Field Safety Officer will include NIOSH International Chemical Safety Data Cards for chemicals present as site constituents of concern and Material Safety Data Sheets (MSDSs) for chemicals brought to the site for the job. For assistance, contact a H&S team member.

D. The Field Safety Officer will ensure employees have been trained on site-specific HazCom, including:

1. Methods that may be used to detect a release of hazardous chemical(s) in the workplace;
2. Physical and health hazards associated with chemicals;
3. Protective measures to be taken;
4. Safe work practices, emergency responses and use of personal protective equipment (PPE); and
5. Information on the Hazard Communication Standard including:
   a. Labeling and warning systems, and
   b. An explanation of Material Safety Data Sheets.

E. The Field Safety Officer will identify PPE based on the task involved and the chemical properties.

F. The Field Safety Officer will inform employees of any non-routine tasks and the chemical hazards associated with the tasks. Review the safe work practices and use of required PPE prior to the start of such tasks.

G. The Field Safety Officer will provide information on hazardous chemicals known to be present to subcontractors and other employers on the site. Employers are responsible for providing necessary information to their employees. Ensure other onsite employers are provided with the applicable HazCom information.

H. All site personnel are required to report any incident of a chemical over-exposure or of a chemical spill to the Field Safety Officer. Follow the emergency response/spill response procedures described in the HASP.

REFERENCES

Regulatory References

- 29 CFR 1910.1200, Hazard Communication

Technical References

NIOSH Universal Chemical Safety Data Cards

Procedural References

- SWP 9, Personal Protective Equipment

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Integrated with ERM H&S program, removed references to RCM

	SAFE WORK PRACTICE	
ERM	SOP #:	2
	Title:	Medical Services / First Aid
	Last Rev.:	1/12/2011
	Page:	1 of 2

SCOPE

This procedure describes the requirements for providing medical services and first aid at the job site.

DEFINITIONS

None.

PROCEDURE

A. H&S team member will identify the mode by which medical services and first aid will be administered and document in the Health and Safety Plan (HASP). This will generally be recorded by identifying the nearest medical facility to the job site and providing a map with the location identified.

B. In the absence of reasonably accessible medical services (i.e., within 5 minutes by ambulance), the Field Safety Officer or a person certified in first aid will be available at the site to render first aid.

C. At jobsites where the eyes or body of any employee may be exposed to corrosive or otherwise hazardous chemicals, quick-drenching/eye washing facilities must be provided.

D. First aid supplies must be easily accessible at a job site, when required. The contents of the kit must be checked by the Site Safety Officer before being sent out on each job and weekly during the job, to ensure that items used are replaced.

E. Field first aid kits should contain the following items:

Band aids 3/4" x 3"
Non-stick pads, medium
Kling rolled bandage 2"
Triangular bandage 51"
Hypo-allergenic first aid cream
Adhesive Tape ½" x 5 yd
Scissors
Butterfly bandages
Antiseptic wipes
Burn cream, 8 oz.
Foil packs
Amoply, ammonia inhalants 0.33 ml.
Tylenol, extra strength
Oval eye pads
Examination gloves

REFERENCES

Regulatory References

- 29 CFR 1926.50, Medical Services and First Aid

Technical References

- ANSI Z308.1-1978, Minimum Requirements for Industrial Unit-Type First-aid Kits

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM

SCOPE

This procedure provides guidance on meeting regulatory requirements when airborne contaminants may be present at the job site. This procedure applies to all types of airborne contaminants which may cause adverse health effects. These contaminants may be in the form of dusts, mists, gases, vapors or fumes.

DEFINITIONS

None.

PROCEDURE

A. H&S team member will develop an Air Monitoring Plan (AMP) for chemical constituents identified at the job site. The AMP must include the types of samples to be collected, such as real-time measurements, personal breathing zone and area samples, as well as identify the contaminants which will be monitored for.

B. Additional regulatory requirements may be triggered if a potential site contaminant is covered by an Occupational Safety and Health Administration (OSHA) substance-specific standard. The following list of contaminants have such regulations:

Asbestos	Coke Oven Emissions
13 Carcinogens	1,2-Dibromo-3-Chloropropane
Vinyl Chloride	Acrylonitrile
Inorganic Arsenic	Ethylene Oxide
Lead	Formaldehyde
Hexavalent Chromium	Methylenedianiline
Cadmium	1,3-Butadiene
Benzene	Methylene Chloride

CHEMICAL-SPECIFIC INFORMATION

Several chemicals listed in the table above are commonly encountered during ERM work on project sites. Additional information for more commonly-encountered chemicals is provided below.

Benzene

Potential employee exposure to benzene most commonly occur at ERM from installation, development, and sampling of groundwater wells, or from performing remediation activities involving benzene-contaminated soil. The occupational exposure limit for benzene is 1 ppm as an 8-hour time weighted average, with a short term exposure limit of 5 ppm as a 15-minute average.

As part of the industrial hygiene program at ERM, periodic eight-hour air samples are collected while ERM employees are performing tasks involving benzene-contaminated or potentially-contaminated soil or groundwater. Results of historical industrial hygiene monitoring and photoionization detector monitoring indicate that ERM employee exposure is well below the PEL.

A written program to reduce employee exposures below the permissible exposure limit is not required based on the results of historical air monitoring. If future monitoring results indicate an exposure over the permissible limit, a written program to reduce employee exposures will be developed and implemented.

Inorganic Lead
ERM employees are potentially exposed to lead from remediation activities where inorganic lead-contaminated soil is present. Past industrial hygiene monitoring has shown the potential for employee exposure to inorganic lead at or able the permissible exposure limit. ERM has developed a Lead Exposure Control Program outlining steps to be taken to control these exposures. The program is located at http://minerva.erm.com/Support/HS/AmericasHS/HS%20Program%20Documents/18.0%20Lead%20Exposure%20Compliance.pdf

REFERENCES

Regulatory References

- 29 CFR 1910.1000, Air Contaminants
- 29 CFR 1910.1001, Asbestos
- 29 CFR 1910.1003, 13 Carcinogens
- 29 CFR 1910.1017, Vinyl Chloride
- 29 CFR 1910.1018, Inorganic Arsenic
- 29 CFR 1910.1025, Lead
- 29 CFR 1910.1026, Hexavalent Chromium
- 29 CFR 1910.1027, Cadmium
- 29 CFR 1910.1028, Benzene
- 29 CFR 1910.1029, Coke Oven Emissions
- 29 CFR 1910.1044, 1,2-Dibromo-3-Chloropropane
- 29 CFR 1910.1045, Acrylonitrile
- 29 CFR 1910.1047, Ethylene Oxide
- 29 CFR 1910.1048, Formaldehyde
- 29 CFR 1910.1050, Methylenedianiline
- 29 CFR 1910.1051, 1,3-Butadiene
- 29 CFR 1910.1052, Methylene Chloride

Technical References

- ACGIH Threshold Limit Values
- NIOSH Pocket Guide to Chemical Hazards

Procedural References

- SWP Respiratory Protection
- SWP Confined Space Entry
- SWP Line Breaking/Blanking

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM
12/21/2011	2	RLE	Added language specific to benzene and inorganic lead

SCOPE

This procedure provides work practices to minimize the impact of heat stress caused by exposure to hot environments or working conditions.

DEFINITIONS

- **Acclimatization –** The ability to adjust to hot working conditions. This adjustment to heat, under normal circumstances, usually takes about 5 to 7 days, during which time the body will undergo a series of changes that will make continued exposure to heat more endurable.

- **Heat Index –** An accurate measure of how hot it really feels when relative humidity (RH) is added to the actual air temperature.

PROCEDURE

A. The Field Safety Officer will implement techniques for preventing heat stress-related health issues. Prevention techniques include:

1. Track the weather forecast for the job site and use forecasted information to plan daily activities. Forecasts may be obtained from:
   - www.nws.nooa.gov
   - National Weather Service Phone Numbers
   - Weather Channel TV Network

2. Provide access to shade as close as feasible to work areas, with adequate ventilation, and permit access by employees at all times. If the temperature does not exceed 85° F, provide access to shade upon request. The interior of a vehicle may not be used to provide shade unless the vehicle is air-conditioned and the air conditioner is on.
3. In situations where provision of shade is not safe or feasible, use alternative cooling measures that provide equivalent protection.
4. Schedule physically demanding and strenuous tasks, or tasks requiring full-body chemical protection, for early in the day, if possible.
5. Drink at least 6-8 ounces of cool water every 60 minutes for the entire work shift.
6. Review with employees during morning tailgate meetings the importance of drinking water and not waiting until they are thirsty, the number and schedule of water and rest breaks, the signs and symptoms of heat illness, and emergency response procedures in the HASP. When the temperature exceeds or is expected to exceed 90° F, encourage employees throughout the work shift to drink water and use shade for breaks and as needed to prevent overheating.
7. During a heat wave or heat spike (e.g., a sudden increase in daytime temperature of 9° F or more), the work day will be cut short, will be rescheduled (e.g.,

conducted at night or during cooler hours), or if possible cease for the day. If schedule modifications are not possible and workers have to work during a heat wave, increase the number of water and rest breaks, supervise workers to ensure that they stop work and take breaks, and observe closely all workers for signs and symptoms of heat illness.

8. Closely supervise employees during heat waves and when starting a new job, to ensure adequate acclimatization.
9. Use the buddy system and look for signs of heat stress. Any employee with signs of heat stress must immediately proceed to a shaded area. Signs and symptoms for various heat stress disorders and recommended first aid are listed in the following table.

Disorder	*Symptoms*	*Cause*	*Prevention/First Aid*
Heat Rash or Prickly Heat	♦ Rash ♦ Itching	♦ Hot, humid conditions ♦ Sweat doesn't evaporate easily ♦ Sweat ducts become clogged	♦ Ointments ♦ Keep skin clean and dry ♦ Good daily personal hygiene
Heat Cramps	♦ Sudden onset of muscle cramps usually in legs or arms ♦ Hot, moist skin ♦ Normal pulse ♦ Normal or slightly elevated temperature	♦ Loss of water (sweating) ♦ Loss of electrolytes ♦ Replacing water but not electrolytes	♦ Move into shade ♦ Loosen clothing ♦ Drink tepid electrolyte drinks or water ♦ Seek medical assistance if conditions persist
Heat Exhaustion	♦ Pale, clammy skin ♦ Profuse perspiration ♦ Thirst from dehydration ♦ Weakness ♦ Headache ♦ Nausea ♦ Loss of coordination	♦ Overexertion ♦ Excessive loss of water and electrolytes	♦ Move into shade ♦ Remove PPE ♦ Loosen street clothing ♦ Cool by applying damp cool compresses or ice packs ♦ Drink tepid electrolyte drinks or water ♦ Summon medical assistance
Heat Stroke	♦ Elevated temperature (>103F) ♦ Flushed, hot, dry skin ♦ Absence of sweating ♦ Delirious ♦ Rapid pulse ♦ Nausea ♦ Headache ♦ Dizziness ♦ Unconsciousness	♦ Failure of body's cooling (sweating) mechanism	♦ Summon medical assistance ♦ Move to shade ♦ Remove PPE ♦ Loosen street clothing ♦ Cool by fanning or applying damp compress or ice packs

10. The Field Safety Officer must verify that a work-rest cycle based on the heat index is implemented for site workers as applicable. Refer to the following three tables. To use the chart, read the temperature at the left and humidity across the top, the heat index is where the two intersect. For example, with a temperature of 96 and a humidity of 50%, the Heat Index is 108. Determine what the associated risk level is, based on the heat index. Use the risk level and heat index to determine the appropriate work-rest cycle.

Heat Index Chart

Relative Humidity (%)														
Temperature (F)		**40**	**45**	**50**	**55**	**60**	**65**	**70**	**75**	**80**	**85**	**90**	**95**	**100**
	110	136												
	108	130	137											
	106	124	130	137										
	104	119	124	131	137									
	102	114	119	124	130	137								
	100	109	114	118	124	129	136							
	98	105	109	113	117	123	128	134						
	96	101	104	108	112	116	121	126	132					
	94	97	100	102	106	110	114	119	124	129	136			
	92	94	96	99	101	105	108	112	116	121	126	131		
	90	91	93	95	97	100	103	106	109	113	117	122	127	132
	88	88	89	91	93	95	98	100	103	106	110	113	117	121
	86	85	87	88	89	91	93	95	97	100	102	106	108	112
	84	83	84	85	86	88	89	90	92	94	96	98	100	103
	82	81	82	83	84	84	85	86	88	89	90	91	93	95
	80	80	80	81	81	82	82	83	84	84	85	86	86	87

Heat Index Risk Level and Associated Health Effects

Heat Index	*Associated Risk*
>130	*Extreme Danger* Heat stroke highly likely with continued exposure
105-130	*Danger* Heat exhaustion and heat cramps likely and heat stroke possible with prolonged exposure and/or physical activity
90-105	*Extreme Caution* Heat cramps and heat exhaustion possible with prolonged exposure and/or physical activity
80-90	*Caution* Fatigue possible with prolonged exposure and/or physical activity

NOTES:

- Heat Index values were devised for shady, light wind conditions. Exposure to full sun may increase these values by up to 15°.
- Heat Index values were devised for the general public wearing typical lightweight summer clothing. Acclimatized workers may be able to work under conditions with a slightly higher Heat Index.
- The use of personal protective equipment, including clothing increases the heat stress load on the body.

The work-rest cycle outlined below should be implemented based on the professional judgment of the Field Safety Officer and/or the Project Health and Safety Consultant. Workers must drink 8 ounces of cool water at each break.

Heat Index	*Risk Level*	*Work-Rest Cycle*
> 130	Extreme Danger	15 minute break every 30 minutes
105-130	Danger	15 minute break every 60 minutes
90-105	Extreme Caution	15 minute break every 90 minutes
80-90	Caution	15 minute break every 120 minutes

B. The Field Safety Officer and the Project and/or Construction Manager will observe workers to verify compliance with and effectiveness of prevention techniques.

C. When an employee displays possible signs or symptoms of heat illness, the Field Safety Officer will check the sick employee and determine whether resting in the shade and drinking cool water will suffice or if emergency service providers will need to be called. WorkCare Incident Intervention (888-449-7787) should also be contacted to provide guidance on appropriate care. Do not leave a sick worker alone in the shade, as he or she can take a turn for the worse!

D. Call emergency service providers per procedures outlined in HASP if an employee displays signs or symptoms of heat illness (loss of consciousness, incoherent speech, convulsions, red and hot face), does not look OK or does not get better after drinking cool water and resting in the shade. While the ambulance is in route, initiate/continue first aid (cool the worker: place in the shade, remove excess layers of clothing, place ice pack in the armpits and join area and fan the victim). Do not let a sick worker leave the site, as they can get lost or die (when not being transported by ambulance and treatment has not been started by paramedics) before reaching a hospital!

E. In the event a heat stress related incident occurs, the Field Safety Officer will report the incident following guidelines in the HASP.

F. Supervisors will be trained on these written procedures prior to being assigned to supervise other workers. Employees will be trained on these procedures via review of the site HASP and through participation in daily site tailgate meetings.

REFERENCES

Regulatory References
Heat Illness Prevention Standard – Title 8 California Code of Regulations Section 3395

Technical References

- NOAA – National Weather Service, Heat Index, Measure of How Hot it Feels

Procedural References
None

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM
8/3/2011	1	RLE	Revised to incorporate CA Heat Illness Prevention Standard

SCOPE

This procedure provides work practices to minimize the impact of cold stress caused by exposure to cold environments or working conditions.

DEFINITIONS

- **Frostbite –** Occurs when the extremities do not get sufficient heat from the central body stores. The fluids around the cells of the body tissues freeze from exposure to low temperatures. This condition can result in damage to, and loss of, tissue. The most vulnerable areas are the nose, cheeks, ears, fingers, and toes.

- **Hypothermia –** This is the most severe form of cold stress and results from a drop in the body's core temperature. Hypothermia can occur in relatively mild temperatures if there is a wind and the person's clothing becomes wet. The signs or symptoms of hypothermia are:
  - First, uncontrollable shivering and the sensation of the cold;
  - Heartbeat slows and may become irregular;
  - Pulse weakens and blood pressure changes;
  - As the body's core temperature drops, other signs may include cool skin, slow irregular breathing, and apparent exhaustion;
  - When core temperatures are in the mid-range, the victim may become listless, confused, exhibit severe shivering, or develop severe pain in the extremities; and
  - Final signs are a significant drop in blood pressure, fatigue, and shallow respiration.

PROCEDURE

A. The Field Safety Officer will implement techniques for preventing cold stress-related health issues. Prevention techniques include:

1. Require the use of additional protective clothing.
2. Allow workers to change clothes that have become wet.
3. Provide thermal insulating materials on metal handles of tools and equipment.
4. In snowy or icy conditions, require the use of UV eye protection, as well as from blowing crystals.
5. Provide a warm and sheltered area for changing clothes and taking breaks.
6. Provide hot liquids, such as soups, warm drinks, etc. in the break area.

7. Use the buddy system and look for signs of cold stress. Any employee observed with signs of cold stress shall immediately proceed to the break area.

B. The Field Safety Officer and the Project and/orConstruction Manager will observe to verify compliance with and effectiveness of prevention techniques.

C. The Field Safety Officer will provide first aid treatment for cold stress related health issues include moving to warm area. Seek medical attention if signs or symptoms of hypothermia or frostbite are present.

REFERENCES

Regulatory References
None.

Technical References
None.

Procedural References
None.

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM

SCOPE

This procedure provides guidance for determining appropriate means for handling natural hazards that may be encountered while conducting fieldwork.

DEFINITIONS

None.

PROCEDURE

Potential exposure to natural hazards during performance of projects performed in the outdoor environment can range from minimal to substantial. The hazards discussed in this document may be present on any outdoor project and should be guarded against. Infrequent hard freezes may allow insects and snakes to be active all year round in some parts of the United States. Refer to Attachments 1 through 3 for photos and more thorough descriptions of the more common natural hazards, which might be encountered.

A. Identify type of natural hazard present.

B. When natural hazards (such as poisonous plants, feral animals, insects and snakes) are encountered, back away and evaluate the situation.

C. Develop a plan which may include any of the following:

1. Remove the natural hazard if it can be done safely.
2. Avoid the natural hazard if it cannot be removed. Additionally, use appropriate PPE or outer clothing for protection from the hazard. Refer to SWP for Personal Protective Equipment.
3. Get assistance in removing or working around the natural hazard. In some instances, this may require professional help from animal control or an insect expert.

D. In the event there is contact with the natural hazard, if it appears to be a life threatening situation, such as anaphylactic shock or a snake bite, seek medical attention immediately.

POISONOUS PLANTS

1. Poison ivy is in the form of a vine, while oak and sumac are bush-like.
2. All produce a delayed allergic hypersensitivity.
3. The plant tissues have an oleoresin, which is active in live, dead, and dried parts and may be carried through dust, contaminated articles, and the hair of animals.
4. Symptoms usually occur 24 to 48 hours after exposure resulting in burning or stinging, and weeping and/or crusted blisters.
5. The best antidote for poisonous plants is recognition and avoidance.
6. Should exposure to any of these plants occur, notify the Field Safety Officer and wash the affected area with a mild soap and water, but do not scrub the area.

TICKS

1. Ticks attach to their host's skin and intravenously feed on its blood creating an opportunity for disease transmission.
2. Covering exposed areas of the body and the use of tick repellent are two ways to prevent tick bites.
3. Periodically during the workday employees should inspect themselves for the presence of ticks. A thorough inspection should be performed at the end of the workday.
4. Notify the Field Safety Officer of any tick bites as soon as possible, medical attention may be required.

SPIDERS

1. Black Widow
   a. The black widow is a common venomous spider found in vacant rodent burrows, under stones, logs and long grass, and in hollow stumps and brush piles.
   b. If disturbed, they typically will retreat to a corner of their web but can be induced to bite only if pressed against the skin.
   c. Notify the Field Safety Officer if bitten, because neurotoxins are injected, it is important to seek immediate medical attention.

2. Brown Recluse
   a. The brown recluse or Fiddle Back Spider is another common venomous spider.
   b. It hides in dark niches and corners, where it may spin a poorly organized, irregular web.
   c. It is shy and will try to run from a threatening situation but will bite if cornered.
   d. Check boots and protective clothing for spiders prior to putting them.
   e. The bite of the brown recluse is usually painless until 3 to 8 hours later when it may become red, swollen, and tender. Notify the Field Safety Officer if bitten.
   f. Prompt medical attention can reduce the extent of ulceration and alleviate other complications that may develop.

FIRE ANTS

1. One sure sign of the presence of fire ants is their conical mounds, which are a result of the digging of their chambers.
2. The sting of a fire ant results in localized reddening of the bite area, accompanied by sharp burning sensations.
3. The first ant sting releases a chemical substance that triggers other ants of the colony to sting.
4. Anyone seeing fire ant mounds present at the work site should notify the Field Safety Officer, who will then notify the rest of the crew so the mounds may be avoided if possible.

CHIGGERS

1. Chiggers, also known as “red-bugs” or “harvest mites”, are the immature stages of a tiny red mite.
2. They inhabit areas of tall grass, associated with low, wet spots, ponds and stream banks, wild berry patches, and forest underbrush.
3. The larvae attach themselves to the clothing of people or to the fur of passing animals.
4. Wear loose-fitting clothing (if possible) when working outdoors. Apply a repellent containing DEET (N,N-diethyl-meta-toluamide), to shoes, socks, and trousers before entering chigger-infested areas. Caution: some individuals may be sensitive to DEET – always read and follow label directions

5. Vehicles should be frequently vacuumed to reduce the number of chiggers that may have been deposited.
6. Flowers of sulfur is another repellant of chiggers. Sulfur may be more benign to use than DEET on some body parts. Avoid breathing dust during application.
7. Shower or bathe at the end of each workday to ensure chiggers are removed.

FLYING INSECTS

1. Flying insects such as mosquitoes, wasps, hornets, and bees may be encountered while site activities occur.
2. Wear long-sleeved clothes and long pants treated with repellent. Do not treat unexposed skin. Use the repellent according to the manufacturer's recommendations provided on the container.
3. Personnel should report flu-like symptoms to the Field Safety Officer, medical attention may be needed.

SNAKES

1. The most effective way to prevent snakebites is to avoid snakes.
2. Personnel should avoid walking in high grass and underbrush.
3. Visual inspection of work areas should be performed prior to activities taking place.
4. The use of leather boots and long pants will be required, since more than half of all bites are on the lower part of the leg.
5. No attempts at killing snakes should be made; many people are bitten in such an attempt.
6. If a snake bites someone, notify the Field Safety Officer and seek medical services.

ALLIGATORS

1. Never approach an alligator. Always stay at least 30 yards away. Never wade or swim in areas that could contain large alligators.
2. Do not dump food or scraps into or near the water. This can attract alligators.
3. Always be aware of your surroundings and use caution and common sense.
4. If at any time personnel observe alligators at the site they will immediately inform the Field Safety Officer, who will then notify the rest of the employees and local wildlife personnel.

FERAL ANIMALS

1. Feral animals such as rats or other wildlife may be encountered during fieldwork.
2. If an animal is diseased, injured or tending a nest, they may become aggressive.
3. Notify the Field Safety Officer if feral animals are at the site, who will then notify the rest of the employees and local wildlife personnel.

ATTACHMENTS

Attachment 1, Poisonous Plants
Attachment 2, Insects
Attachment 3, Snakes
Attachment 4, Other Natural Hazards

REFERENCES

Regulatory References

None

Technical References

None

Procedural References

SWP Personal Protective Equipment

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM
7-30-12	1	DH	Last sentence corrected

Attachment 1

Poisonous Plants

Most species of poison ivy, oak, and sumac have three leaflets; hence, the saying, "Leaves of three, let it be." These plants vary significantly in appearance in different regions of the country, but in most species the flower and fruit structures arise in the angle between the leaf and the twig, the flowers are greenish in spring, and the plant's mature fruit is off-white or pale yellow-green.

Several varieties, including two species each of poison ivy, poison oak, and poison sumac and six subspecies of poison ivy (*Toxicodendron radicans*), are found in the United States. Poison ivy (see figure A below) generally grows east of the Rocky Mountains and poison oak in the West. Both poison ivy and poison sumac are found along the Gulf Coast. Poison oak prefers swampy areas in the Southeast.

Figures A1, A2: Courtesy of Lisa A. Gamer, MD; figure A3: staff photo; figure A4: Janet Robidoux

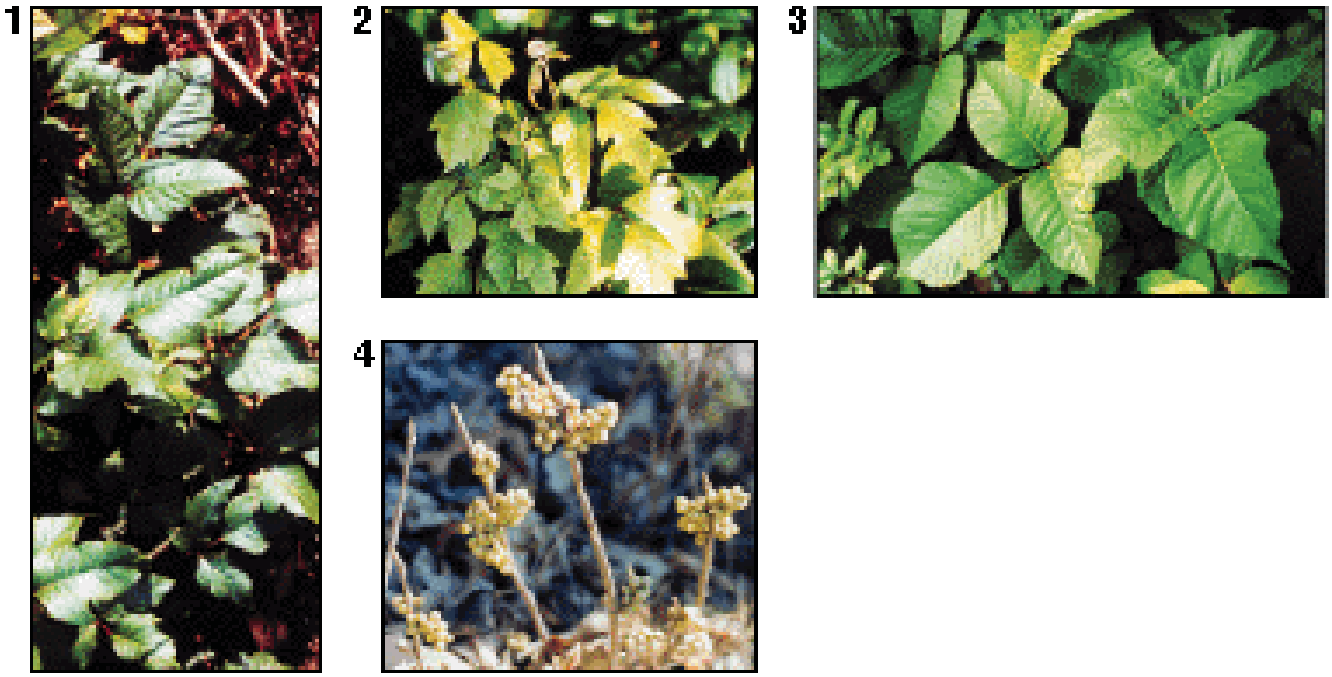


Figure A. Poison ivy (Toxicodendron radicans) can grow as a shrub or vine, but all varieties are characterized by glossy leaves that grow in clusters of three leaflets. The varieties shown here are found in Texas (1,2) and Minnesota (3). The off-white or pale yellow-green berries of poison ivy (4) often remain on the plant through the winter.

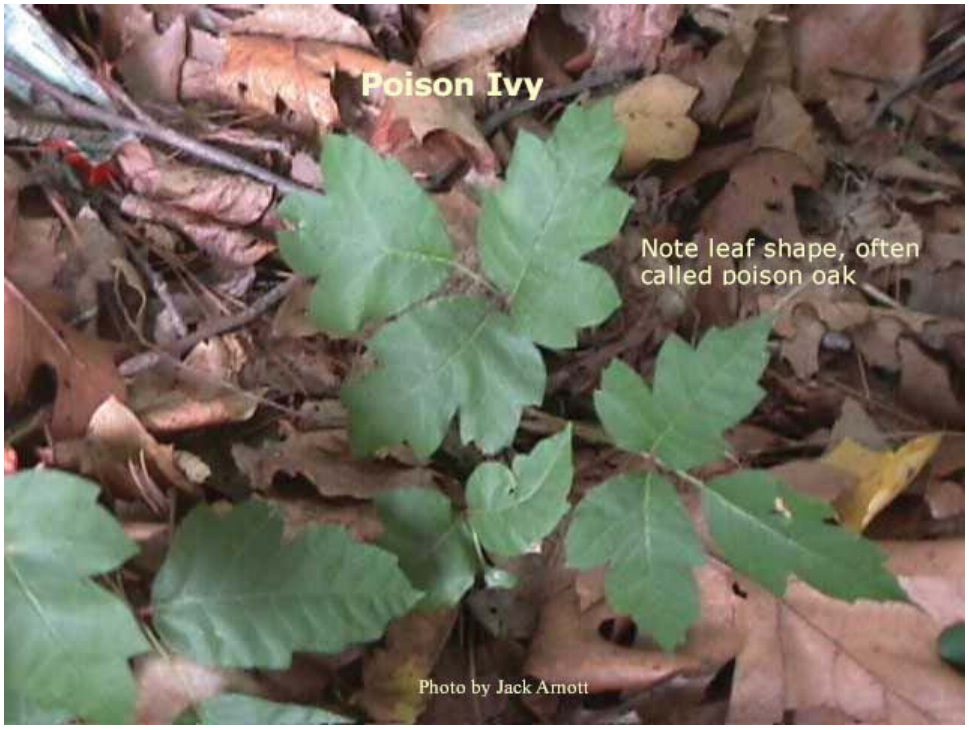
Poison Ivy

A climbing vine with three serrated-edge, pointed leaves grows in the East, Midwest and South. In the northern and western states, poison ivy grows as a non-climbing shrub.

The appearance of these plants is variable. Leaves are alternate and normally consist of three leaflets with the stalk of the central leaflet being longer than those of the other two are but can be found with five or even seven leaflets. The leaflets are two to four inches long, dull or glossy green with pointed tips. The middle leaflet is generally larger than the two laterals. The edges of the leaflets may be toothed, lobed, or smooth. Virginia Creeper (*Parthenocissus quinquefolia*) is non-poisonous vine with five leaflets that is often mistaken for poison ivy.

Poison ivy can be a shrub or a woody vine. Yellowish-green flowers occur in compact clusters in leaf axils, in June or July followed by waxy, gray-white berries about three-sixteenths of an inch in diameter in late summer.


Virginia Creeper
Parthenocissus quinquefolia
Poison Ivy
Toxicodendron radicans
Photo by Jack Arnott


Poison Ivy
Note leaf shape, often called poison oak
Photo by Jack Arnott

Poison Oak

Poison oak also has three leaves. It grows in the sandy soil of the Southeast as a small shrub. In the western United States poison oak is a very large plant that grows as a standing shrub or climbing vine. Eastern poison oak has the most "oak-looking" leaves of any of the species. It usually has multi-lobed leaves, no aerial roots on the stems, and fuzzy fruits and leaves. It loves sandy soils. Western poison oak is found only along the Pacific coast and into the mountains and it usually has aerial roots extending from the main stem.

Poison Sumac

A shrub or bush with two rows of 7-13 leaflets, most common in the peat bogs of the Northern United States and in swampy Southern regions of the country. A water loving swamp shrub (dendritic) or bush with two rows of 7-13 leaflets; growing from 6 to 20 feet in height, the Poison Sumac is found in the east from Quebec to Florida and westward along the coast to far west Texas between Shelby and Hardin counties.

Listed below are recommended actions to take to reduce the potential exposure to poisonous plant:

- Determine what types of poisonous plants may be present at the specific site.
- Use repellant sprays and coatings.
- Use netting or long sleeves with cuffs and long pants.
- Regularly inspect skin.
- Maintain a first aid kit on hand.

Attachment 2
Insects

Chiggers

Chiggers, also known as "red-bugs" or "harvest mites", are the immature stages of a tiny red mite. They inhabit areas of tall grass, associated with low, wet spots, ponds and stream banks, wild berry patches, and forest underbrush. The larvae attach themselves to the clothing of people or to the fur of passing animals. Before settling down to feed, chiggers move to a constriction, such as sock tops, waistbands, or armpits. Feeding chiggers inject a salivary fluid, which dissolves the host's cells, and then they suck up the liquefied tissue. Within a few hours, small, reddish, intensely itching welts appear. These bites may continue to itch for several days up to two weeks after the chigger is dislodged. Following are suggestions that should provide some protection from chiggers:

- Stay out of areas where chiggers are likely to be present including wood lots, pastures, roadside ditches, or other areas with tall grasses and weeds. Chiggers are especially common in moist low-lying areas.
- Wear loose-fitting clothing (if possible) when working outdoors. Vehicles should be frequently vacuumed to reduce the number of chiggers that may have been deposited.
- Apply a repellent containing DEET to shoes, socks, and trousers before entering chigger-infested areas. Caution: some individuals may be sensitive to DEET – always read and follow label directions.
- Another repellant of chiggers is flowers of sulfur. Flowers of sulfur is powdered elemental sulfur available at a drug store or pharmacy as an over-the-counter preparation. It has a slight, rotten egg smell. Areas on the body that have tight clothing up against them such as socks, waistbands, etc. may be dusted with sulfur powder. Surveyors and other field personnel state that they fill a sock with sulfur and are able to dust these areas efficiently.

Sulfur may be more benign to use than DEET on some body parts. Avoid breathing dust during application.

- Immediately after possible exposure to chiggers, take a bath, thoroughly scrubbing the body with hot soapy water. This will kill or dislodge many of the chiggers. The clothes that were worn when the bite(s) occurred should be placed in a plastic bag for temporary storage until they can be laundered.
- When bites begin to itch, one course of treatment is to apply rubbing alcohol, followed by one of the nonprescription local anesthetics. A baking soda paste, calamine lotion, or product such as "After-Bite" also will help reduce discomfort. Avoid scratching bites since this only increases irritation and may lead to a secondary infection of the bite.

Ticks

Ticks are vectors of many different diseases including Rocky Mountain spotted fever, Q fever, tularemia, Colorado tick fever, and Lyme disease. They attach to their host's skin and intravenously feed on its blood creating an opportunity for disease transmission. Covering exposed areas of the body and the use of tick repellent are two ways to prevent tick bites. Periodically during the workday employees will inspect themselves for the presence of ticks. If a tick is discovered, the following procedure should be used to remove it:

- Do not try to detach a tick with your bare fingers; bacteria from a crushed tick may be able to penetrate even unbroken skin. Fine-tipped tweezers should be used.
- Grip the tick as close to your skin as possible and gently pull it straight away from you until it releases its hold.
- Do not twist the tick as you pull and do not squeeze its bloated body. That may actually inject bacteria into your skin.
- Thoroughly wash your hands and the bite area with soap and water. Then apply an antiseptic to the bite area.
- Save the tick in a small container with the date, the body location of the bite, and where you think the tick came from.
- Notify the FSO of any tick bites as soon as possible.

Recently, Lyme disease has been the most prevalent type of disease transmitted by ticks in the United States.

Spiders

A common venomous spider is the Black Widow. The adult female is glossy black with short, almost microscopic hairs and a crimson hourglass marking on the underside of the abdomen. They are found in dark corners of barns, stables, garages and piles of boxes and crates. They have also been known to reside in vacant rodent burrows, under stones, logs and long grass, and in hollow stumps and brush piles. Generally, Black Widows are not aggressive and usually can be induced to bite only if pressed against the skin. If disturbed, they typically will retreat to a corner of their web. However, these spiders are more aggressive if they are protecting an egg sac. After a bite, a dull numbing pain in the affected extremity occurs. In addition, pain and some muscular rigidity in the abdomen or the shoulder, back, and chest may occur. The bite may also produce headache, dizziness, skin rash, nausea, vomiting, anxiety and weakness, and increased skin temperature over the affected area may be observed. Ice may be placed over the bite to reduce the pain. Bites are rarely fatal to adults, but because the black widow spider injects neurotoxins, it is important to seek immediate medical attention.

Another venomous spider common in the southern United States is the Brown Recluse or Fiddle Back Spider. The Brown Recluse is about 1/4 to 1/2 inches in body length (most adults are about the size of a United States dime to a US quarter with legs extended). Coloration ranges from tan to dark brown, with the abdomen often darker than the rest of the body. The feature that most distinguishes the brown recluse from many other harmless spiders is a

somewhat darker violin-shaped marking on top of the leg-bearing section of the body. The neck of the violin "silhouette" points towards the rear (abdomen) of the spider. The brown recluse roams at night seeking its prey. During the day, it hides in dark niches and corners, where it may spin a poorly organized, irregular web. Eggs are deposited in 1/2 inch long off-white silken egg sacs, often appearing flattened beneath and convex above. It is shy and will try to run from a threatening situation but will bite if cornered. People are sometimes bitten while they are asleep because they roll onto a brown recluse spider while it is hunting in the bed. More often the victim is bitten while putting on a shoe or piece of clothing that a spider has selected for its daytime hiding place. The bite of the brown recluse is usually painless until 3 to 8 hours later when it may become red, swollen, and tender. Later the area around the bite site may develop into an ulcerous sore from 1/2 to 10 inches in diameter. Healing often requires a month or longer, and the victim may be left with a deep scar. Prompt medical attention can reduce the extent of ulceration and alleviate other complications that may develop. It should be noted that not all brown recluse bites result in ulcerations or scarring.[1]

Fire Ants

Fire ants are approximately 1/4-inch long and live in underground chambers that typically contain over 1,000 ants. One sure sign of the presence of fire ants is their conical mounds, which are a result of the digging of their chambers. The sting of a fire ant results in localized reddening of the bite area, accompanied by sharp burning sensations. The first ant sting releases a chemical substance that triggers other ants of the colony to sting. Anyone seeing fire ant mounds present at the work site should notify the SSHO, who will then notify the rest of the crew so the mounds may be avoided if possible.

Flying Insects

Flying insects such as mosquitoes, wasps, hornets, and bees may be encountered while site activities occur. Section 3.4.4 discusses problems associated with them. Mosquitoes can be the vectors for diseases such as the West Nile Virus and Saint Louis Encephalitis, reports of which appear in the media periodically. Avoiding mosquito bites is the best way to avoid potential exposure to mosquito-borne disease. Apply insect repellant containing DEET (N,N-diethyl-meta-toluamide), wear long-sleeved clothes and long pants treated with repellent and stay indoors during peak mosquito feeding hours (dusk until dawn) to further reduce your risk.

There is currently no vaccine to protect humans against Saint Louis Encephalitis or West Nile Virus. Individuals at project sites can reduce their risk from being infected with West Nile Virus by taking the following actions to protect against mosquito bites:

- Review the hazards of West Nile Virus periodically in morning safety meetings.
- Increase protective measures when working at dawn, dusk, and in the early evening.
- Reduce the area of exposed skin when working outdoors. Long-sleeved shirts with sleeves rolled down are recommended. Understand that mosquitoes may bite through thin clothing, so personnel should evaluate the actual Level D clothing worn, for example, heavy, long

sleeve work shirts and heavy dungarees/jeans may be indicated. Activity at projects where disposable coverall use (i.e., Tyvek®) is specified, further reduces the risk of mosquito bites.

- For activities where only Level D PPE is specified, consider using disposable coveralls when working in wooded, highly vegetated, or swampy areas.
- Use an insect repellent containing approximately 30 percent DEET. In concentrations greater than 35 percent, DEET provides no additional protection. Use the repellent according to the manufacturer's directions provided on the container. Use just enough repellent to cover exposed skin and clothing. Do not treat unexposed skin. Frequent reapplication or saturation is unnecessary for effectiveness. Avoid prolonged and excessive use of DEET.
- When additional protection against mosquitoes is necessary, commercially prepared "clothing and gear" insect repellants containing 0.5 percent permethrin may be used. These repellants, such as Repel Permanone™ are available in the sporting goods departments at major retailers. Clothing and gear insect repellants are not for use on skin. Use the repellent according to the manufacturer's recommendations provided on the container.
- After returning from outdoor field activities, wash treated skin with soap and water.
- Personnel should report flu-like symptoms to the FSO.

West Nile Virus

The Centers for Disease Control and Prevention report that human illness from West Nile virus is rare, even in areas where the virus has been reported. The chance that any one person is going to become ill from a mosquito bite is low. West Nile virus is spread by the bite of an infected mosquito, and can infect people, horses, many types of birds, and some other animals. Most people who become infected with West Nile virus will have either no symptoms or only mild ones. On rare occasions, West Nile virus infection can result in a severe and sometimes fatal illness known as West Nile encephalitis (an inflammation of the brain). The risk of severe disease is higher for persons 50 years of age and older. There is no evidence to suggest that West Nile virus can be spread from person to person or from animal to person.

Saint Louis Encephalitis

The Centers for Disease Control and Prevention report mild infections occur without apparent symptoms other than fever with headache. More severe infection is marked by headache, high fever, neck stiffness, stupor, disorientation, coma, tremors, occasional convulsions (especially in infants) and spastic paralysis. There is no evidence to suggest that Saint Louis encephalitis can be spread from person to person or from animal to person.

Table 1

Flying Insect Information

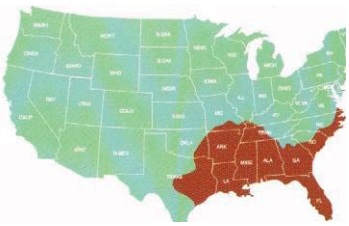
Organism	Description	Habitat	Problem	Severity	Protection
Hornet	One inch long with some body hair. Abdomen is mostly black.	Round, paper like nest hanging from trees, shrubs, or under eaves of buildings.	One nest may contain up to 100,000 hornets that will attack in force at the slightest provocation.	Severe pain, allergic reactions similar to bees.	Do not come near or disturb nest. If a hornet investigates you, do not move.
Mosquito	Small, dark, fragile body with transparent wings. From 1/8 to 1/4 inch long.	Where water is available for breeding.	Bites and sucks blood. Itching and swelling result.	Can transmit encephalitis and other diseases. Scratching causes secondary infections.	Use plenty of insect repellant and wear gloves. Stay in windy areas.
Wasp	Very thin waist. Color can be black, yellow or orange with stripes.	Underground nest. Paper-like honeycomb nest in abandoned buildings hollow trees, etc.	Stings. Some species will attack if you get too close to the nest.	Severe pain, allergic reactions similar to bees. Can be fatal.	Avoid Nest. Do not swat at them.
Bee	Generally have yellow and black stripes and two pair of wings.	Hollow logs, underground nest, old buildings,	Stings when annoyed. Leaves venom sac in victim.	If person is allergic, nausea, shock, constriction of the airway can result. Death may result.	Be careful and watch where you walk. Cover exposed skin. Avoid areas where bees are swarming. Avoid wearing sweet fragrances and bright clothing. Move slowly or stand still when bees are swarming about you.

Attachment 3
Snakes

Copperhead


Coral

Cottonmouth

Diamondback Rattlesnake


Water Moccasin

The most effective way to prevent snakebites is to avoid snakes in the first place. Personnel should avoid walking at night or in high grass and underbrush. Visual inspection of work areas should be performed prior to activities taking place. The use of leather boots and long pants will be required, since more than half of all bites are on the lower part of the leg. No attempts at killing snakes should be made; many people are bitten in such an attempt.

If a snake bites someone, the following treatment should be initiated:

- Keep patient calm
- Notify emergency medical services
- Wash the wound and keep the affected body part still
- Apply direct pressure to site of bite if bleeding is extreme
- Keep the affected area lower than the heart
- Carry a victim who must be transported, or have him/her walk slowly
- Transport to closest medical facility

Attachment 4
Other Natural Hazards

Alligators

Alligators live in nearly all Louisiana parishes but are most common in the major river drainage basins and large lakes in the southern portion of the state. Most attacks involve animals over six feet long. Alligators become more active in the beginning of March, peaking in May, which is their mating season. Females will nest in June - July, and the eggs will hatch in August and September. Even a small amount of impounded water may contain a large alligator. Twilight and night are prime times for alligator attacks. Never approach an alligator. Always stay at least 30 yards away. Never wade or swim in areas that could contain large alligators. Do not dump food or scraps into or near the water. This can attract alligators. Always be aware of your surroundings and use caution and common sense. If at any time personnel observe alligators at the site they will immediately inform the SSO, who will then notify the rest of the crew and local wildlife personnel.

Feral Animals

Feral animals such as rats or other wildlife may be encountered during fieldwork. Typically, feral animals are as afraid or more afraid of humans and when encountered will run away from human contact. However, if an animal is diseased, injured or tending a nest, they may become aggressive. The most common disease encountered with feral animals is rabies. Signs of a rabies-infected animal include:

- Changes in an animal's behavior;
- General sickness;
- Difficulty swallowing;
- An increase in drool or saliva;
- Wild animals that appear abnormally tame or sick;
- Animals that may bite at everything if excited;
- Difficulty moving or paralysis; and
- Death.

Animals in the early stage of rabies may not have any signs, although they can still infect you if they bite you. The incubation period is the time from the animal bite to when signs appear. In rabies, it is usually 1-3 months. However, it can last as long as several years. Once the virus reaches the brain or spinal cord, signs of the disease appear. **In the event an animal is encountered on the site, do not approach it.** If it exhibits one or more of the signs listed above, call local wildlife personnel to get assistance.

	SAFE WORK PRACTICE	
ERM	SOP #:	7
	Title:	Personal Protective Equipment
	Last Rev.:	1/12/2011
	Page:	1 of 3

SCOPE

This procedure provides guidance for determining appropriate Personal Protective Equipment (PPE) to be worn at the job site, based on new tasks and chemical or physical agents identified in the field. The initial determination for proper PPE is completed as part of development of the HASP.

DEFINITIONS

None.

PROCEDURE

A. The Field Safety Officer will complete a hazard assessment of the tasks involved and identify the appropriate PPE based on the task and the chemical or physical agents involved. The written hazard assessment certification must be documented in the HASP.

B. The Field Safety Officer will communicate to employees the PPE requirements for the tasks involved.

C. The Field Safety Officer will provide PPE that properly fits the employee(s).

D. The Field Safety Officer will conduct daily site walks to verify appropriate use of PPE.

E. A H&S team member or Field Safety Officer will provide training to the employees which includes at least the following:

1. When PPE is necessary;
2. What PPE is necessary;
3. How to properly don, doff, adjust and wear PPE;
4. The limitations of the PPE; and
5. The proper care, maintenance, useful life and disposal of the PPE.

F. Re-training by the Field Safety Officer may be required if:

1. Changes at the job site make previous training obsolete.
2. Changes in the types of PPE make previous training obsolete.
3. Inadequacies in an affected employee's knowledge or use of PPE indicate the employee requires additional training.

G. Types of PPE include the following:

1. Eye and Face Protection

a. All eye and face protection must comply with ANSI Z87.1-1989.
b. Safety glasses
   - Side shields must be worn when there is a hazard of flying objects.
   - Prescription glasses must meet the ANSI Z87.1-1989 requirements or must have eye protection over them meeting the ANSI standard requirements.
c. Chemical goggles
d. Face shield

2. Head Protection
   a. All head protection (hard hats) must comply with ANSI Z89.1-1989.

3. Foot Protection

   All foot protection must comply with ANSI Z41-1991.
   a. Safety-toed shoes
   b. Rubber boots or rubber safety-toed boots

4. Hand Protection

   Hand protection must be selected based on the performance characteristics of the hand protection relative to the task(s) to be performed, conditions present, duration of use and the hazards and potential hazards identified. A member of the H&S team must verify and document selection of appropriate chemical resistant gloves.
   a. Work gloves, such as leather or cotton
   b. Chemical gloves, such as nitrile, neoprene, Viton, butyl rubber
   c. Cut-resistant gloves, such as Kevlar

5. Hearing Protection
   a. Ear plugs
   b. Ear muffs

6. Respiratory Protection (Refer to SOP – 9)

7. Other PPE
   a. Disposable Coveralls
   b. Fire Resistant Clothing

REFERENCES

Regulatory References

- 29 CFR 1910.132, Personal Protective Equipment, General Requirements
- 29 CFR 1910.133, Eye and Face Protection
- 29 CFR 1910.135, Head Protection

- 29 CFR 1910.136, Foot Protection
- 29 CFR 1910.138, Hand Protection

Technical References

- ANSI Z87.1-1989, American National Standard Practice for Occupational and Educational Eye and Face Protection
- ANSI Z89.1-1989, American National Standard for Personal Protection – Protective headwear for Industrial Workers – Requirements
- ANSI Z41-1991, American National Standard for Personal Protection – Protective Footwear

Procedural References

- SWP Respiratory Protection

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM

	SAFE WORK PRACTICE	
ERM	SOP #:	8
	Title:	Respiratory Protection
	Last Rev.:	1/12/2011
	Page:	1 of 4

SCOPE

This procedure identifies the work practices and regulatory requirements with regard to respiratory protection.

DEFINITIONS

- **Escape Respirators** – Respiratory devices providing protection only during escape from hazardous atmospheres.

- **Hazardous Atmosphere** - (1) Any atmosphere containing a toxic or disease-producing gas, vapor, dust, fume, or mist, either immediately or not immediately dangerous to life or health; or (2) Any oxygen-deficient atmosphere.

- **Immediately Dangerous to Life or Health (IDLH)** – A condition that poses a threat of exposure to airborne contaminants when that exposure is likely to cause death or immediate, or delayed, permanent adverse healths effects, or prevent escape from such an environment.

- **Oxygen Deficient Atmosphere** – An atmosphere containing less than 19.5 percent oxygen by volume.

PROCEDURE

A. The Field Safety Officer must verify that all employees required to wear respiratory protection at the jobsite are qualified (i.e., have completed a medical evaluation, been fit-tested and are trained.)

B. An H&S team member will select respiratory protection based on the hazards at the jobsite. Selection of respiratory protection will be completed as part of the hazard assessment when completing the HASP. If unanticipated conditions are encountered at the jobsite requiring a change in respiratory protection, follow the respiratory protection upgrade process defined in the site specific HASP. Additionally , the Field Safety Officer should contact a H&S team member to re-evaluate PPE requirements

C. Inspection

1. All workers must inspect all non-emergency respirators before each use and during cleaning.
2. The Field Safety Officer must inspect respirators used for emergency use, at least monthly and in accordance with the manufacturer's recommendations, and must check for proper function before and after each use. See Section G of this SOP for situations requiring emergency use respirators.
3. Respirator inspection shall include:

- Check for tightness of connections.
- Check condition of inlet coverings, head harness, valves, connecting tubes, harness assembly, hoses, filter, cartridges, canisters, end-of-service-life indicator, electrical components, and shelf-life date(s).
- Check all rubber and elastomeric parts.
- Check all air cylinders for proper charge.
- For respirators maintained for emergency use, the inspection must be documented with the date of the inspection, the name of the inspector, the findings, remedial action taken, and a serial number or other means if identifying the respirator. A tag or label must be affixed to the storage compartment and replaced with a subsequent inspection tag/label.

4. Any respirator that does not pass inspection shall be immediately removed from service to be repaired or replaced.

D. Use

1. No facial hair is allowed which could come between the sealing surface of the face piece and the face, or interfere with the valve function.
2. Eye protection must be worn such that it does not interfere with the face piece seal.
3. Conduct a seal-check (positive and negative pressure) every time the respirator is donned.
4. The Field Safety Officer must evaluate continuing respirator effectiveness
   - Maintain surveillance of work area to assess jobsite conditions and respirator wearer(s) exposure or stress levels have not changed;
   - Direct respirator wearers to leave the work area:
     - to wash their faces and face pieces to prevent eye or face irritation associated with respirator use;
     - if a respirator wearer detects vapor or gas breakthrough, changes in breathing resistance or leakage of the face piece;
     - to replace the respirator filter, cartridge or canister elements.
   - If a respirator wearer detects breakthrough, changes in breathing resistance or leakage, they must replace or repair the respirator before returning to the work area. Change schedules for substances other than particulates will be addressed in the HASP or Job Hazard Analysis.

E. Maintenance

1. Clean and sanitize respirator after each use.
2. If respirators are not assigned, each respirator must be cleaned and sanitized before being used by a different employee.

3. Respirators being used for emergency use shall be cleaned after being used. These respirators must contain a tag or label on them telling the last date they were inspected and who inspected them.
4. Each respirator shall be cleaned in warm water (not exceeding 110^0F or 43^0C) with sanitizers that effectively clean the respirator and contain an antibacterial agent. For additional cleaning procedures, refer to 29 CFR 1910.134, Appendix B-2, Respirator Cleaning Procedures (Mandatory).
5. Replacement of parts or repairs may be done only by persons trained in proper respirator maintenance and assembly.
6. Replacement parts used shall be only those designated specifically for the respirator being repaired.
7. Any respiratory equipment not repairable, must be destroyed and discarded.

F. Site workers must store respirators to protect them from:

1. physical damage including face piece or valve deformation;
2. contamination;
3. dust;
4. sunlight;
5. extreme temperatures;
6. excessive moisture; and
7. damaging chemicals.

G. Special Circumstances (including but not limited to Immediately Dangerous to Life and Health (IDLH) or unknown concentrations)

ERM employee entry into areas where atmospheres are IDLH or of unknown/suspected high concentrations is not authorized unless the NAHSD concurs. If the Field Safety Officer or Project/Construction Manager encounters special circumstances in the field which were not anticipated in the HASP, such as an IDLH atmosphere or an atmosphere with unknown concentrations or unknown constituents, contact a H&S team member for assistance. Conditions requiring Self-Contained Breathing Apparatus (SCBA) or airline respiratory protection may require additional medical evaluation, fit-test of a different face piece and additional training. Additionally, when using supplied air, additional criteria apply regarding breathing air quality, quantity and flow. For additional information, refer to 29 CFR 1910.134(i).

REFERENCES

Regulatory References

- 29 CFR 1910.134, Respiratory Protection

Technical References

None

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM

	SAFE WORK PRACTICE	
ERM	SOP #:	9
	Title:	Confined Space Entry
	Last Rev.:	1/12/2011
	Page:	1 of 2

SCOPE

This procedure provides work practices to meet regulatory requirements for working in confined spaces and to ensure that proper planning has occurred as part of development of the HASP. It is meant as an information document for ERM subcontractors who perform confined space entry. There are two types of confined spaces covered by this procedure: a permit-required confined space and a non-permit confined space.

ERM employees are not authorized to enter confined spaces. If an emergency circumstance occurs where entry into a permit-required confined space is required, the NAHSD must be consulted and must concur with the entry.

DEFINITIONS

- **Confined Space –** An area which:
  - Has adequate size and configuration for employee entry;
  - Has limited means of access or egress; and
  - Is not designed for continuous employee occupancy.

- **Entry into a Confined Space –** The action by which a person passes through an opening into a permit-required confined space. Entry includes ensuing work activities in that space and is considered to have occurred as soon as any part of the entrant's body breaks the plane of an opening into the space.

- **Non-permit Confined Space** - A confined space that does not contain or, with respect to atmospheric hazards, have the potential to contain any hazard capable of causing death or serious physical harm.

- **Permit-Required Confined Space –** A confined space that has one or more of the following characteristics:
  - Contains or has a potential to contain a hazardous atmosphere;
  - Contains a material that has the potential for engulfing an entrant;
  - Has an internal configuration such that an entrant could be trapped or asphyxiated by inwardly converging walls or by a floor which slopes downward and tapers to a smaller cross-section; or
  - Contains any other recognized serious safety or health hazard.

PROCEDURE

A. It is ERM's standard policy and practice to never enter into a confined space, as defined above. In situations where an ERM subcontractor enters a confined space, a detailed written Confined Space Entry Program must be developed for the specific site and

specific conditions anticipated to be encountered. Under these circumstances, the subcontractor's Confined Space Entry Program must be reviewed and approved by the NAHSD, and attached as part of the site specific HASP.

B. Additionally, specific training must be completed for any individual(s) involved in confined space entry in accordance with 29 CFR 1910.146.

REFERENCES

Regulatory References

- 29 CFR 1910.146, Permit-Required Confined Spaces

Technical References

None

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Clarified ERM position on our employees entering confined spaces of any type, renumbered, integrated with ERM H&S program, removed references to RCM

	SAFE WORK PRACTICE	
ERM	SOP #:	10
	Title:	Drum Handling
	Last Rev.:	1/12/2011
	Page:	1 of 2

SCOPE

This procedure identifies the work practices and regulatory requirements regarding drum handling at the jobsite.

DEFINITIONS

None.

PROCEDURE

A. When handling drums, follow the general drum handling requirements listed below:

1. Hazardous substances and contaminated, liquids and other residues must be handled, transported, labeled, and disposed of in accordance with 29 CFR 1910.120(j).
2. When practical, drums and containers must be inspected and their integrity must be assured prior to being moved.
3. Unlabeled drums and containers must be considered to contain hazardous substances and handled accordingly until the contents are positively identified and labeled.
4. Drums must be handled only if necessary. Prior to handling, all personnel should be warned about the hazards of handling and instructed to minimize handling as much as possible.
5. Drums and containers that cannot be moved without rupture, leakage, or spillage must be emptied into a sound container using a device classified for the material being transferred.
6. A ground-penetrating system or other type of detection system or device will be used to estimate the location and depth of buried drums or containers.
7. Soil or covering material must be removed with caution to prevent drum or container rupture.
8. Fire extinguishing equipment meeting the requirements of 29 CFR Part 1910, Subpart L, must be on hand and ready for use to control incipient fires.

B. When opening drums and containers, such as for sampling or waste characterization purposes, handling shock sensitive wastes, radioactive wastes, or when shipping drums, a site specific drum handling plan must be developed, reviewed by the NAHSD, and included in the HASP

REFERENCES

Regulatory References

- 29 CFR 1910.120(j), Handling Drums and Containers

- 29 CFR 1926.65(j), Handling Drums and Containers

Technical References
None

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM, changed development and approval requirement for site-specific drum handling plan

SCOPE

This procedure provides requirements and safe work practices for personnel involved in excavation work. Please review the Excavation Safety Checklist (Attachment 1) in verifying that this procedure is being followed.

DEFINITION

- **Accepted Engineering Practices** – those requirements, which are compatible with standards of practice required by a registered professional engineer.
- **Benching (Bench System)** – a method of protecting employees from cave-ins by excavating the sides of an excavation from one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.
- **Cave-in** –the separation of a mass of soil or rock from the sides of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity to entrap, bury, or otherwise injure and immobilize a person.
- **Competent Person** - one who is capable of identifying existing and predictable hazards in the surroundings, or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them
- **Excavation** - any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.
- **Face or Sides** – the vertical or inclined earth surfaces formed as a result of excavation work.
- **Hazardous Atmosphere** – an atmosphere which by reason of being explosive, flammable, poisonous, corrosive, oxidizing, irritating, oxygen deficient, toxic, or otherwise harmful, may cause death, illness, or injury.
- **Protective System** –a method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. Protective Systems include support systems, sloping and benching systems, shield systems, and other systems that provide the necessary protection.
- **Registered Professional Engineer** – a person who is registered as a professional engineer in the state where the work is to be performed.
- **Shield (Shield System)** –a structure that is able to withstand the forces imposed on it by a cave-in and thereby protect workers with in the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses.

- **Shoring (Shoring System)** – a structure such as a metal hydraulic lift, mechanical or timber shoring system that supports the sides of an excavation and which is designed to prevent cave-ins.
- **Sloping (Sloping System)** –a method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation. The angle of incline required to prevent a cave-in varies with differences in factors such as the soil type, environmental conditions of exposure, and application of surcharge loads.
- **Support System** – means a structure such as underpinning, bracing, or shoring, which provides support to an adjacent structure, underground installation, or the sides of an excavation.

PROCEDURE

A. Prior to the start of excavation, the Project/Construction Manager must complete the ERM subsurface clearance procedure to verify clearance of subsurface hazards at the excavation site. Subcontractor Contact should identify the location of utility installations (e.g., sewer, telephone, electric, water lines, etc.) that may be expected to be encountered during excavation.

1. Contact the utility company (-ies) and advise of proposed work requesting them to establish the location of the underground installations.
2. Underground installations must be protected, supported, or removed as necessary to safeguard employees.

B. When equipment is operated adjacent to an excavation or is required to approach the edge of an excavation, a warning system, such as barricades, hand or mechanical signals, or stop logs must be utilized. The system should be inspected:

1. Prior to the start of work and as needed throughout the shift.
2. After every rainstorm or other site condition change that could increase the instability of the excavation.

C. To prevent exposure to harmful levels of atmospheric contaminants or oxygen deficiency (atmospheres containing less than 19.5% oxygen), the following requirements apply:

1. The atmospheres in the excavation must be tested before employees enter excavations greater than 4 feet in depth per SWP 9 Confined Space Entry
2. The proper respiratory protection should be provided per SWP 8 Respiratory Protection.

3. When controls are used that are intended to reduce the level of atmospheric contaminants to acceptable levels, testing must be conducted as often as necessary to verify that the atmosphere remains safe.

D. Emergency rescue equipment, such as breathing apparatus, a safety harness and line, or a basket stretcher, must be readily available where hazardous atmospheric conditions exist or may reasonably be expected to develop during work in an excavation. The equipment should be attended when in use.

E. Employees should not work in excavations where water has accumulated or is accumulating, unless protective measures such as special support or shield systems to protect from cave-ins have been implemented to protect the employees against the hazards posed by water accumulation.

1. If water is controlled or prevented from accumulating by the use of water removal equipment, a competent person must monitor the water removal equipment and operations.

2. Diversion ditches, dikes, or other suitable means must be used to prevent surface water from entering the excavation and to provide drainage of the area adjacent to the excavation.

3. Excavations subject to runoff from heavy rains require an inspection by a competent person.

I. Stability of other structures endangered by excavation operations must be stabilized by support systems such as shoring, bracing, or underpinning for the protection of employees. A registered professional engineer should be consulted for determination of stability of structures that may be affected during the excavation work.

K. The ERM subcontractor contact should verify materials and equipment are free from damage or defects that might impair their proper function.

L. Daily inspections of excavations, the adjacent areas, and protective systems must be made by a competent person for evidence of a situation that could result in possible cave-ins, indications of failure of protective systems, hazardous atmospheres, or other hazardous conditions. A helpful excavation safety checklist is provided as Attachment 1.

ATTACHMENT

- Excavation Safety Checklist

REFERENCES

Regulatory References

- 29 CFR 1926.650 Scope,Application, and Definitions Aapplicable to this Subpart (Subpart P).
- 29 CFR 1926.651 Specific Excavation Requirements.
- 29 CFR 1926.652 Requirements for Portective Systems.

Technical References

None

Procedural References

ERM's Subsurface Clearance Procedure

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM

ATTACHMENT 1: EXCAVATION SAFETY CHECKLIST

Job Site	Yes	No	NA	Excavation	Yes	No	NA
Prior to starting the job, were utilities notified and underground services located?	☐	☐	☐	Have the supervisors and workers been trained in excavation safety laws and procedures?	☐	☐	☐
Were overhead transmission lines noted and precautions taken to ensure that equipment does not come in contact with them?	☐	☐	☐	Have building, utility poles, trees and any other surface encumbrances or destabilizing forces been taken into consideration?	☐	☐	☐
Have adequate signs been posted and barricades provided?	☐	☐	☐	Has soil classification been done?	☐	☐	☐
Are the workers wearing reflective vests, if necessary?	☐	☐	☐	Has the appropriate means of safeguarding the excavation by OSHA requirements been determined by a Competent Person?	☐	☐	☐
Are vehicles, equipment, and spoil piles correctly placed to allow for the safe passage of traffic and the progress of the construction?	☐	☐	☐	For excavations 4 feet (1.2 meters) deep or more, are ladders, steps or ramps available within25 feet (7.6 meters) of lateral travel?	☐	☐	☐
Has traffic control (fire depts., etc.) been notified?	☐	☐	☐	Are all open pits or shafts either covered or barricaded?	☐	☐	☐

Job Site	Yes	No	NA	Excavation	Yes	No	NA
Is the appropriate safety gear on site?	☐	☐	☐	Are spoil piles at least 2 feet from the edge of the excavation and properly sloped?	☐	☐	☐
Have undermined structures been shored, braced or underpinned, or has a registered Prof. Engineer determined that such measures are not necessary?	☐	☐	☐	Have confined-space atmospheric hazards been considered?	☐	☐	☐
Are utilities crossing the excavation supported from above and does protection from falling materials exist?	☐	☐	☐	Do bridges and walkways have standard guardrails?	☐	☐	☐
				Have means been provided to remove water from the excavation?	☐	☐	☐
				Competent person available on site at all times.	☐	☐	☐

NOTE: Shoring and shielding must be removed in a manner that ensures the safety of workers, and excavations must be back filled as soon as work is completed.

SCOPE

This procedure defines minimum expectationse for the safe use and maintanence of tools and equipment, including tools and equipment which may be furnished by employees.

DEFINITIONS

Torque: The circular or rotating motion in tools such as drills, impact wrenches, saws, etc. which results in a strong twisting force

PROCEDURE

A. HAND TOOLS

1. Every tool was designed to do a certain job and employees should use tools only for their intended purpose.
2. Maintain hand tools in good condition - sharp, clean, oiled. .
3. Do not force tools beyond their capacity or use "cheaters" to increase their capacity. Do not use tools for pry bars.

B. PORTABLE POWER TOOLS

1. GUARDING

Guards or shields must be installed on all power tools before issue. Do not use improper tools or tools without guards in place.

C. OPERATING PRACTICES

1. Loose clothing, rings, and other jewelry must not be worn around operating machines. Keep sleeves buttoned or rolled up.
2. Keep fingers away from moving parts. Shut off machines to remove waste. Use a brush to clean up and debur. Be sure machine is fully stopped and not coasting.
3. Inspect at least daily before start-up. Look for loose or damaged parts and inadequate lighting.
4. Use clamps or vise to hold work.
5. Many machines have Safety Interlocking devices. Verify their operation prior to use , and NEVER BYPASS SAFETY INTERLOCK DEVICES.
6. Examine each power tool before using it. Look for damaged parts, loose fittings, frayed or cut electric cords. Tag and return defective tools for repairs.

7. Some machines use both pneumatic and electric power. Both must be shut off to make repairs or to adjust moving parts. Bleed down tool to remove any stored energy left in the system.
8. Be prepared in case of jamming**.** Maintain good footing; and use two hands, Circular saws, chain saws and percussion tools shall not be equipped with a locking switch or trigger
9. Flying objects **c**an result from operating almost any power tool. Be aware of others working around you and use proper eye protection.
10. Keep moving parts directed away from your body. Never touch a powered part unless power source is disconnected (such as drill chucks, blades, and bits).
11. Ground Fault Circuit Interrupters (GFCI**) a**re required when using electrical power tools.

REFERENCES

Regulatory References

- 29 CFR 1910.241 Definitions.
- 29 CFR 1910.242 Hand and Portable Powered Tools and Equipment, General.
- 29 CFR 1910.243 Guarding of Portable Power Tools.
- 29 CFR 1910.244 Other Portable Tools and Equipment.
- 29 CFR 1926.300 General Requirements.
- 29 CFR 1926.301 Hand Tools.
- 29 CFR 1926.302 Power-operated Hand Tools.

Technical References

None

Procedural References

SWP 7 Personnel Protective Equipment

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM

	SAFE WORK PRACTICE	
ERM	SOP #:	14
	Title:	Fall Prevention and Fall Protection
	Last Rev.:	1/12/2011
	Page:	1 of 2

SCOPE

This procedure provides work practices to meet regulatory requirements regarding fall prevention/fall protection for all employees working 6 feet or more above a lower level.

DEFINITIONS

None.

PROCEDURE

A. Fall prevention/protection is required when there is an unprotected side or edge which is 6 feet or more above a lower level. Example situations include but are not limited to:

1. Horizontal walking/working surfaces;
2. Leading edges;
3. Holes in flooring or walls;
4. Formwork and reinforcing steel;
5. Ramps, runways and other walkways;
6. Excavations;
7. Roof work;
8. Precast concrete erection; and
9. Walking/working surfaces not otherwise addressed.

B. In addition, protection from falling objects must also be provided to employees working below, by requiring the use of head protection as well as one of the following methods:

1. Erect toeboards, screens or guardrail systems to prevent objects from falling from higher levels; or
2. Erect a canopy structure and keep potential objects far enough from the edge so they would not go over if they were accidentally misplaced; or
3. Barricade the area into which the objects could fall and prohibit employees from entering into the barricaded area.

C. Where fall prevention, in the form of a physical barrier, is not feasible, and a fall hazard exists, fall protection is mandatory. Fall protection can take on many forms depending on the job task being performed, i.e., permanent and temporary vertical and horizontal lifeline systems, full body harness, shock absorbing lanyards, nets, retractable devices, etc. These are some of the most common methods of fall protection available.

D. In the event work is to be conducted at a height greater than 6 feet, fall prevention and/or fall protection requirements must be incorporated into the HASP. The H&S team must develop a fall prevention/protection plan which will incorporate the use of

physical barriers, administrative controls or fall protection equipment. This plan will be included in the HASP for the site.

E. Additionally, training must be completed for any individual who will be using fall prevention / fall protection equipment. The Field Safety officer must verify all workers have received the appropriate training relative to fall prevention / fall protection.

REFERENCES

Regulatory References

- 29 CFR 1926.501, Duty to Have Fall Protection
- 29 CFR 1926.502, Fall Protection Systems Criteria and Practices

Technical References

None

Procedural References

None

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Integrated with ERM H&S program, removed references to RCM

SCOPE

This procedure defines requirements for safe operation of heavy equipment operation. Heavy equipment includes backhoes, cranes, derricks, dozers, loaders, skid steers, and trucks. It is meant as a reference document to supply to ERM subcontractors to communicate minimum requirements for these activities.

ERM personnel are not authorized to operate heavy and materials handling equipment discussed in this Safe Work Practice.

DEFINITIONS

- **Crane** - means a mechanical device, intended for lifting or lowering a load and moving it horizontally, in which the hoisting mechanism is an integral part of the machine. A crane may be a fixed or mobile machine.
- **Derrick** - A "derrick" is an apparatus consisting of a mast or equivalent member held at the head by guys or braces, with or without a boom, for use with a hoisting mechanism and operating ropes.

PROCEDURE

A. TRAINING

1. Equipment operators must demonstrate training and experience with each piece of equipment before receiving authorization to begin work.

B. INSPECTION

1. All heavy equipment must meet applicable design standards (i.e., ANSI, etc.).
2. The equipment must have a copy of the most recent annual and periodic inspections onboard.
3. The Subcontractor Contact or a designated qualified person must inspect all heavy equipment prior to operation (See Crane and Derrick Inspection Checklist), to verify proper working condition.
4. A copy of the manufacturer's operating manual must be carried on all heavy equipments. The manual must include a load-rating chart that indicates safe loads in various configurations, wire and cable minimums and maximums, and any special operating considerations.

C. OPERATION

1. The Subcontractor must have a standard operating procedure that is implemented for heavy equipment operation.
2. Equipment must be operated in accordance with the manufacturer's instructions and recommendations.
3. Before starting equipment, the equipment operator must make sure no one is working on or near the machinery. If equipment must be operated in close proximity to other operations, a spotter will be required to work with the equipment operator. The spotter and equipment operator must be in radio communication
4. Equipment operators must wear seatbelts and operate equipment in accordance with safe operating speeds and loading
5. When working on slopes, the equipment should be positioned perpendicular to the slope with the center of gravity of the equipment on the lower edge of the slope.
6. Dump trucks must lower their beds **PRIOR** to moving from the dump site
7. All employees should wear appropriate personal protective equipment in accordance with SWP 7 Personal Protective Equipment.
8. Equipment operators should not get on or off a moving machine.

Note: If heavy equipment is located near overhead power lines, contact a member of the H&S team to determine safe working distances.

ATTACHMENTS

- Crane and Derrick Inspection Checklist

REFERENCES

Regulatory References

- 29 CFR 1910.181 Derricks.
- 29 CFR 1926.550 Cranes and Derricks.
- 29 CFR 1926.600 Equipment.
- 29 CFR 1926.601 Motor Vehicles.
- 29 CFR 1926.602 Material Handling Equipment.

Technical References

None

Procedural References

SWP 7 Personal Protective Equipment

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM

ATTACHMENT 1

CRANE AND DERRICK INSPECTION CHECKLIST

Prior to operation each day, inspect:

1. ☐ All control mechanisms for maladjustment interfering with proper operation.
2. ☐ All control mechanisms for excessive wear of components and contamination by lubricants or other foreign matter.
3. ☐ All operator aids, motion and load limiting devices, and other safety devices for malfunction and inaccuracy of settings.
4. ☐ All chords and lacing.
5. ☐ All hydraulic and pneumatic systems - with particular emphasis given to those which flex in normal operation of the crane.
6. ☐ Hooks and latches for deformation, chemical damage, cracks, and wear.
7. ☐ Rope for proper spooling onto the drum(s) and sheave(s) and rope reeving for compliance with crane manufacturer's specifications.
8. ☐ Electrical apparatus for malfunctioning, signs of excessive deterioration, dirt, and moisture accumulation.
9. ☐ Hydraulic system for proper oil level.
10. ☐ Tires for recommended inflation pressure (mobile cranes).
11. ☐ Wedges and supports for looseness or dislocation (climbing tower cranes).
12. ☐ Braces and guys supporting crane masts; anchor bolt base connections for looseness or loss of preload (tower cranes and derricks).
13. ☐ Derrick mast fittings and connections for compliance with manufacturer's recommendations.
14. ☐ Barge or pontoon ballast compartments for proper ballast; deck loads for proper securing; chain lockers, storage, fuel compartments, and battening of hatches; fire fighting and lifesaving equipment in place and functional; hull void compartments sounded for leakage (floating cranes and derricks).

	SAFE WORK PRACTICE	
ERM	SOP #:	17
	Title:	Personnel Platform (Man Basket) and Aerial Work Platform
	Last Rev.:	1/12/2011
	Page:	1 of 3

SCOPE

This procedure provides guidance on the use, testing, loading and safe work practices for the personnel and aerial platforms. It has been developed as a reference document to provide ERM subcontractors.

ERM personnel are not authorized to operate equipment referenced in this Safe Work Practice.

DEFINITIONS

- **Aerial Device** - An "Aerial device" is any vehicle-mounted device, telescoping or articulating, or both, which is used to position personnel.
- **Platform** – A "Platform" is any personnel-carrying device (basket or bucket) which is a component of an aerial device.

PROCEDURE

A. USE

Personnel platforms should only be used when the erection, use and dismantling of conventional means such as a ladder, stairway, , elevated work platform or scaffold, would be hazardous, or is not feasible because of structural design or work site conditions. Only trained persons shall operate personnel and aerial platforms.

B. TESTING

Trial lift, inspection and proof testing.

1. A trial lift with unoccupied personnel platform loaded at least to the anticipated lift weight shall be made from ground level.
2. Daily trial lift shall be performed immediately prior to placing personnel on the platform.
3. The lift operator shall determine daily that all systems, controls and safety devices are activated and functioning properly.
4. The operator is to remain under the 50 percent limit of the hoist's rated capacity.
5. The primary attachment shall be centered over the platform.

C. PERSONNEL PLATFORM

1. Must support its' own weight and five times the maximum intended load.

2. Handrail must comply with Subpart M of the OSHA standard.
3. The platform shall be enclosed from the toeboard to the mid-rail
4. A grab rail must be installed inside the entire perimeter of the platform.
5. Swing out gate access face shall be equipped with a restraining device to prevent accidental opening.
6. Overhead protection is necessary when employees are exposed to falling objects.
7. The platform must be posted or permanently marked indicating weight of platform and maximum rated load capacity.

D. WORK PRACTICES

1. All body parts are to be kept inside the platform during the raising and lowering of the Personnel Platform.
2. Before employees enter or exit a hoisted personnel platform, the platform shall be secured to the structure unless this creates an unsafe condition.
3. Employees occupying the personnel platform shall use a body harness system capable of supporting a fall impact for employees using the anchorages. Employees working over or near water shall comply with OSHA standard 1926.106.
4. The personnel platform shall not be used as a material hoist.

E. PRE-LIFT MEETING

1. A pre-lift meeting attended by the lift operator and his foreman, signal person, and employees to be lifted and their foreman shall be held to review the appropriate provisions of the procedure.

NOTE: Refer to OSHA standard 1926.550 cranes and derricks for additional information.

REFERENCES

Regulatory References

- 29 CFR 1910.67 Vehicle-mounted Elevating and Rotating Work Platforms.
- 29 CFR 1926.552 Material Hoists, Personnel Hoists, and Elevators. Standard.
- 29 CFR 1926.550 Cranes and Derricks.
- 29 CFR 1926.106 Working over or near water

Technical References

None

Procedural References

None

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM, clarified ERM position on employees operating powered personnel platforms and aerial work platforms

	SAFE WORK PRACTICE	
ERM	SOP #:	19
	Title:	Lockout/Tagout
	Last Rev.:	1/12/2011
	Page:	1 of 3

SCOPE

This procedure provides guidance on the control hazardous of energy to prevent injury to employees due to unexpected start-up or release of stored energy.

DEFINITIONS

- **Affected Employee**

  Any employee whose job requires them to operate or use a machine or equipment on which servicing or maintenance is being performed under lockout/tagout or whose job requires them to work in an area in which such servicing or maintenance is being performed.

- **Authorized Employee**

  Any employee who locks out or initiates a tagout procedure on machines or equipment in order to perform servicing or maintenance on that machine or equipment. An affected employee becomes an authorized employee when that employee's duties include performing servicing or maintenance covered under this procedure.

- **Circuit Breaker**

  Switch (housed in a distribution panel) controlling the flow of electricity (on/off) to the electrical equipment.

- **Control Switch**

  The switch controlling the flow or electricity between the disconnect switch source and the electrical equipment. Also called:

  a. Start-Stop button.
  b. Butterfly switch.
  c. Control station.

- **Disconnect Switch**

  Switch (normally housed in an electrical control room) controlling the flow of electricity (on/off) to the equipment and its control switch. This switch is also called:

  a. Combination starter switch.
  b. Switch and starter.

- **Zero Mechanical or Energy State**

  That state of a machine in which every power source that can produce machine member movement has been locked out. This includes blocking, controlling or isolation of electric, kinetic or potential energy sources

- **Multi-Lockout Devices**

  A multi-lockout hasp mechanism which can be used so more than one lock can be attached during a lockout. Lock boxes are another alternative for using multiple locks.

- **Personal Lock**

  A safety lock used by authorized personnel that is durable and capable of withstanding excessive force. Any authorized employee uses it to lock out equipment. All locks will be on a "One Lock, One Key, One Employee" system.

- **Tags**

  A standard tag signed and dated shall be attached to the individual's lock. The tag shall be attached by passing the grommet through the lock shackle. The legend on the tag shall read, "DANGER, DO NOT OPERATE". Tags shall be capable of withstanding the environment to which they are exposed for a maximum period of time that exposure is expected.

PROCEDURE

1. The Project/Construction Manager shall inform the affected party responsible for the machinery or equipment being repaired or serviced that the equipment needs to be shut down so it can be locked out, tagged out and tried (electrical only).
2. The authorized party shall be responsible for the de-energizing switches, circuit breakers, pneumatic valves, or hydraulic valves, which control the operations of machinery or equipment that contains or ever contained hazardous energy.
3. Prior to the start of any work, all machines and equipment must be brought to a "zero mechanical/energy state. The Authorized Employee conducting the lockout should attempt to activate ("Try") the equipment with the starting device, to verify the equipment does not show any sign of stored energy.
4. Each authorized employee shall remove their personal lock and tag when they have completed their job and are no longer required to perform any other task on the equipment.
5. When work continues beyond the shift, an individual's lock and tag may remain in place if the Site allows. However, when returning to continue the work, each individual shall check their own lock and tag prior to starting work. Each individual must re-date their tag daily through out the duration of the job. The re-dating will confirm that the individual checked their personal lock, assuring the equipment remains locked out.
6. Shift change and new crews coming in requires the change-out of locks and tags.

A. GROUP LOCKOUT

1. When it is impractical because of the magnitude or complexity of large jobs such as major facility shutdown or overhaul, group lockout can be utilized.

    a. The Project/Construction Manager shall be responsible for arranging the shutdown for energized equipment to be locked and tagged out.
    b. The Subject Matter Expert shall apply locks and tags to all disconnect switches to be worked on.
    c. The keys shall be placed in a group lockbox or comparable mechanism. It shall have a hasp and keeper, which will permit application of a "Lockout Device" so it can accommodate more than one lock.
    d. Each authorized employee shall affix their personal locks and tag with their name and date to the "Lockout Device" on the "Group Lockbox".
    e. Each authorized employee is to test by "Trying" the control switch to assure the equipment has been electrically de-energized before starting work.

REFERENCES

Regulatory References

- 29 CFR 1910.147 The Control of Hazardous Energy (Lockout/Tagout).

Technical References

None

Procedural References

None

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM

	SAFE WORK PRACTICE	
ERM	SOP #:	20
	Title:	Wall and Floor Penetrations
	Last Rev.:	1/12/2011
	Page:	1 of 2

SCOPE

This procedure provides guidance on the minimum safety requirements for wall / floor penetrations. Potential hazards that may exist when wall / floor openings are made (in addition to fall hazards) include but are not limited to, concealed pipes, existing electrical wiring, telephone lines and fire alarms.

PROCEDURE

Prior to cutting into walls/floors, visually survey the area of penetration to see if there are any pipes or electrical services that my present an obstacle. If blueprints are available, the Subcontractor should review the prints to determine if any services are present that may be hidden in the wall/floor. Hidden hazards should be expected. Services may be supplied from adjacent floors, rooms or concealed in floors.

Prior to cutting / penetrating walls / floors:

1. Determine if the wall is bearing or nonbearing.
2. For interior walls, remove the ceiling tiles to help determine what services may be hidden in the wall.
3. Cutting both faces of the wall at the same time is prohibited.
4. Barricade both sides of the wall or floor.
5. When it has been determined that utilities are in the wall or floor, and may present a hazard / interference, SWP 19 "Lockout/Tagout Procedure" must be implemented.
6. All floor or wall openings must comply with OSHA 29 CFR 1910.23 "Guarding Floor and Wall Openings and Holes".
7. Before any power saws are used on masonry walls or floors, a visual inspection of both sides of the surface must be made for all utilities.
8. On hollow core walls, exploratory openings shall be made prior to creating an enlarged opening utilizing power tools.
9. The Subsurface Clearance Process must be followed for poured floors requiring core boring.

REFERENCES

Regulatory References

- 29 CFR 1910.23 Guarding Floor and Wall Openings.

Technical References

None

Procedural References

ERM Subsurface Clearance Procedures

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
12/31/07	0	ELG	Issued for use
1/12/2011	1	RLE	Renumbered, integrated with ERM H&S program, removed references to RCM

SCOPE

This procedure provides guidance to ERM employees on the minimum safety requirements for work in areas where ionizing radiation is an employee exposure concern as a known or suspected hazard, as required by Title 29 of the *Code of Federal Regulations* (CFR), Part 1910.96, "Ionizing Radiation," and the requirements of 10 CFR, Part 20, "Standards for Protection Against Radiation" (applicable to environmental consultants). It does not address hazards for non-ionizing forms of radiation such as infrared, ultraviolet, microwave, radio waves, and so on. Health and safety plans (HASP) for work sites with known or suspected ionizing radiation shall include this SWP or the associated Job Hazard Analysis (JHA) as an attachment. General guidelines, exposure limits, and procedures are discussed below.

1.0 GENERAL GUIDELINES

ERM intends to keep all employee radiation exposure levels as low as reasonably achievable (ALARA). Field workers should use a combination of engineering controls, administrative controls, and personal protective equipment (PPE) to limit external and internal radiation doses. Basic protection control measures that apply to all forms of radiation include (1) reducing exposure time, (2) increasing distance from the radiation source, and (3) using a shield between the radiation source and employees. Additional guidelines are listed below.

- Personnel will be protected from internal and external radiation exposure hazards through general and site-specific training, use of PPE, adherence to strict work practices, and proper decontamination procedures.
- Ingestion of contaminated material will be prevented through good personal hygiene. Eating, drinking, and smoking are not permitted in potentially contaminated areas. Washing hands when leaving a contaminated area and before eating is required.
- Employees with open cuts or abrasions are not allowed to handle contaminated material because handling may allow entry of the material into the bloodstream.
- Pregnant employees will be advised not to work in areas with known or suspected radiation hazards. However, if a pregnant woman wants to work, limits on declared pregnant workers defined in 10 CFR, Part 20 apply.

The field safety officer (FSO) is responsible for ensuring that personnel are appropriately monitored for exposure to ionizing radiation. A radiation safety officer (RSO) may be assigned to a site to assist the FSO as conditions dictate.

2.0 EXPOSURE LIMITS

Ionizing radiation presents a hazard as both a source of external exposure and as a contaminant of surfaces and media. Radiation exposure limits as established by the Nuclear Regulatory Commission (NRC) are presented below.

Type of Exposure	Annual Limit
Whole body (head and trunk), active blood-forming organs, or gonads	5 roentgen equivalent in man (rem) per year, total effective dose
Lens of the eye	15 rem per year
Extremities	50 rem per year
Skin of the whole body	50 rem per year

In addition to the whole-body doses listed above, the NRC has also established derived air concentrations (DAC) for airborne radioactive materials (RAM) exposures. Table 1 of Appendix B, 10 CFR, Part 20, lists DACs for RAMs. The DAC values are designed to maintain internal exposure doses below the annual limit for intake (ALI), assuming a 40-hour per week exposure period. Total body dose calculations must factor in the contribution of airborne RAM to the total dose. The table in 10 CFR, Part 20, should be consulted when calculating internal exposures through inhalation of specific radionuclides.

3.0 PROCEDURES

The following sections discuss procedures related to personal monitoring, environmental monitoring, restricted areas, training, PPE, decontamination, and exposure and medical records associated with work at sites involving potential exposure to radiation.

3.1 PERSONAL MONITORING

Each individual working at a site with the potential for radiation exposure will participate in a monitoring program designed to measure worker external and internal radiation doses. The instrument and devices used for this monitoring as well as monitoring procedures and protocol are discussed below.

3.1.1 External Radiation Dosimetry

In most cases, external radiation exposure will be measured by thermoluminescent dosimeters (TLD), film badges, or pocket dosimeters. The determination of the appropriate dosimeter for a specific project will be made based on site history and potential risk for exposure to external ionizing radiation. Specific badge handling procedures will be provided on a case-by-case basis.

TLDs that measure x-ray, beta, and gamma radiation are general use dosimeters that measure external ionizing radiation levels to which personnel are exposed. They are analyzed after each calendar quarter to comply with Occupational Safety and Health Administration (OSHA) and NRC requirements. ERM shall provide TLDs to field workers who routinely work in areas with potential radiation hazards. If TLDs are needed for long-term projects lasting more than 5 months, the division health and safety leader or NAHSD will provide additional guidance to ERM employees.

Employees scheduled for short-term field work where potential radiation hazards exist should use pocket dosimeters. Pocket dosimeters should be used for field work lasting 1 to 2 days. Pocket dosimeters can be used along with TLDs to provide real-time exposure monitoring. Employees using a pocket dosimeter in areas exceeding the applicable radiation exposure action levels must record the radiation dose daily in a field logbook. A copy of recorded exposures above background levels must be submitted to the safety team within 15 calendar days of field work completion. If the pocket dosimeter indicates that an individual has received a radiation dose of 100 millirems or more, the individual will be removed from field work and his or her TLD will be processed immediately. Pocket dosimeters must be requested through the ERM safety team.

In the event of a lost or damaged TLD, the site FSO and/or RSO will determine a dose estimate for the individual by using values recorded on direct-reading instruments. If such a dose cannot be determined, the maximum permissible radiation dose for the time period in question for the affected employee will be recorded in the field logbook.

3.1.2 Airborne Radioactive Material Measurement

Airborne RAM may enter the body during inhalation resulting in an internal radiation dose. NRC regulations require the measurement of airborne RAM concentrations whenever inhalation exposures may result in an intake in excess of 10 percent of the ALI for that RAM as defined in Appendix B, Table 1, of 10 CFR, Part 20. In accordance with principles of ALARA, ERM shall require monitoring of airborne RAM under all circumstances of potential exposure.

Airborne RAM may be emitted by processes involving RAM or from radioactive contamination in dirt, debris, and on surfaces that have been disturbed. Monitoring shall be conducted using air sampling devices appropriate for personal monitoring and shall account for all potential periods of exposure. Samples shall be submitted to an accredited laboratory for analysis as soon as possible.

3.2 ENVIRONMENTAL MONITORING

The types of radiation sources, RAM, and types and extent of impacts to the site (such as superrficial contamination), will determine which survey instruments are necessary to characterize the site. Both area radiation levels and surface contamination levels will be monitored. Survey instruments will be specified in the HASP. ERM can obtain the necessary radiation survey instruments for area monitoring through equipment vendors.

If used on field projects, ERM personnel will monitor site conditions with direct-reading instruments when site information is sufficient to show that the potential for ionizing radiation exposure exists or when specific site information is not sufficient to eliminate the possibility of radiation sources or contamination. The initial site evaluation will include a review of available site data, including site history.

Upon startup of field activities, regular monitoring will be conducted if necessary to track the locations and intensities of RAM. Monitoring of airborne RAM within work areas and at the site's downwind perimeters is also required.

Results of radiation and contamination surveys shall be documented in the field logbook and the logbook shall remain on site for the duration of site activities. As work progresses at the site, survey and contamination maps shall be updated accordingly.

3.3 RESTRICTED AREAS

Restricted areas are designated to control personnel exposures to RAM and to prevent the spread of contamination out of the area. The posting of warning signs around restricted areas shall follow the requirements of 10 CFR, Part 20, Subpart J. Restricted areas shall be designated in the HASP as the exclusion zone or a portion of the exclusion zone.

3.4 TRAINING

Specific training requirements for work assignments involving potential exposure to RAM or radioactive contamination should be included in the site-specific HASP. Training requirements are not specified in 10 CFR, Part 20. However, ERM will require employees working with or

potentially exposed to RAM to receive specific training on RAM and the hazards associated with the specific site. General RAM training will include the following topics:

- Types and properties of ionizing radiation
- Acute and long-term health effects of exposure to ionizing radiation
- Exposure routes
- PPE for RAM
- Administrative and engineering exposure controls
- Personal, area, and contamination monitoring devices and their uses
- Basic requirements of 10 CFR, Parts 19 and 20

Site-specific training will address the following topics:

- Types of RAM and ionizing radiation at the site
- Locations of RAM at the site
- Designated restricted and contaminated areas
- Decontamination methods
- Personal, area, and contamination monitoring devices designated for the site
- Emergency procedures for RAM incidents

3.5 PERSONAL PROTECTIVE EQUIPMENT

A minimum of full Level C protection with disposable coveralls must be worn in any potentially radiation-contaminated area. ERM personnel will use air purifying respirators with high-efficiency particulate air (P100) cartridges to prevent inhalation of airborne alpha particles and radionuclides. This level of protection will prevent or minimize radioactive material from contacting skin. PPE must be thoroughly decontaminated with extreme care to prevent the spread of contamination to other areas. Contaminated material on the skin must be removed as quickly as possible. Supplied air respirators can also be used depending on the hazard and work activity.

3.6 DECONTAMINATION

Generally, decontamination procedures for RAM are the same as for hazardous waste; however employees should take the following additional precautions:

- Know where contamination is and avoid tracking equipment and personnel through it
- Use proper decontamination techniques
- Use straight detergent, soap and water, or commercially prepared solutions to remove RAM (solutions containing ethylenediamine tetraacetic acid, such as Radiacwash®, will bind up RAM and maintain the RAM in solution before rinsing)
- Consider all decontamination materials to be contaminated; decontamination waste will contain RAM and must be disposed of properly

3.7 EXPOSURE AND MEDICAL RECORDS

ERM shall maintain records of radiation exposure of all employees for whom personnel monitoring was conducted. Records will be evaluated to verify that exposures are maintained at ALARA levels. ERM is obligated to evaluate ionizing radiation exposure data to verify that exposures are maintained at ALARA levels and will provide a yearly summary exposure report to each participating employee. If quarterly results indicate high exposure, the employee will be notified immediately. Retained radiation exposure records will indicate exposure in millirems per calendar quarter, DAC hours of airborne radiation exposure, and the calculated combined dose for the total body (summary of the external and internal doses) using methods for calculating total body dose presented in 10 CFR, Part 20.1202.

Special medical examinations may be necessary when excessive external or internal doses of radioactive materials are suspected to have occurred. Medical evaluation needs will be established on a case-by-case basis with the advice of the ERM consulting physician. Any instance of suspected overexposure should be reported immediately to the FSO. The FSO will contact the appropriate safety team personnel for recommendations on how to proceed with follow-up medical evaluations.

ERM shall maintain exposure records for former employees along with their medical records in accordance with applicable regulations. These records will be available to former employees within 30 days of receipt of a written request for them.

	SAFE WORK PRACTICE	
	SOP #:	22
	Title:	Safe Use of Portable and Dedicated Electrical Submersible Pump Systems to Mitigate Hazard of Electrical Shock
	Last Rev.:	5/24/2011
	Page:	1 of 3

SCOPE

This procedure defines minimum expectations for the safe use of portable and dedicated electrical submersible pump systems, including tools and equipment to be used by employees.

DEFINITIONS

AC Voltage Detector: sensor used to detect the presence of electricity. The closer it comes to live electrical lines, the louder the signal becomes.

Pump System: comprised of all equipment and materials required to purge/sample groundwater from within a constructed groundwater well.

1. Submersible Pump
2. Control Box
3. Electrical Cables

PROCEDURE

A. VISUAL INSPECTION

1. Inspect all electrical pump system wires, insulation, and plugs. For dedicated pumps that cannot be removed from the well for inspection without use of a drilling rig, inspect all at-grade system components. Establish a schedule for regular removal and inspection/maintenance of dedicated pump systems.
2. Maintain sampling equipment in good condition – dry, clean, rust-free, etc.
3. Ensure power source has a built-in ground fault circuit interrupter (GFCI).
4. Ensure well head is properly fastened to well casing and is crack free.

B. ELECTRICAL POWER SUPPLY

1. Properly attach all power components (i.e., plugs, control boxes, etc.)
2. Conduct a second thorough visual inspection to confirm the sample network is properly setup.
    i. Confirm that pump control box switch is in **OFF** position.
    ii. Ensure that all plugs are properly connected.
3. Do not touch any part of the wellhead. Turn on power supply.
4. Turn on pump control box.
5. Use AC voltage detector to confirm that all external parts of the pump system (i.e., sample port, sample riser, well head, tubing, etc.) are not electrically charged.

C. OPERATING PRACTICES

1. Inspect sample equipment before start-up at each well location. Look for loose or damaged parts and inadequate jacketing/insulation.
2. Examine each piece of equipment before using it. Look for damaged parts, loose fittings, frayed or cut electric cords. Tag and return defective tools for repairs.
3. Shut off power and use formal lockout-tagout (LO/TO) program to make any repairs, perform maintenance, or adjust moving parts. Only qualified employees who have been authorized by ERM and trained by ERM in LO/TO procedures can perform this work.
4. Never touch a powered/live part unless power source is disconnected (such as control box, electical converter, sample riser, etc.) Note that some pump control boxes have an embedded capacitor which remains charged for a period of time after the power is disconnected. Often, a visual indicator, such as an LED light, will extinguish once the unit is fully de-energized. Do not touch a powered/live part until this LED light fully extinguishes.
5. The use of insulated rubber electrical gloves when handling external parts of the pump system while system is powered is recommended.
6. GFCI**s** are required when using an industrial generator as the power supply. The use of a safety switch is not required in low-voltage scenarios (i.e., 12 volts).
7. Do not sample well if pump system is faulty and none of the above mentioned safety measures can be applied.

D. TRAINING REQUIREMENTS

1. Field personnel are familiar with and trained on the proper use of
    i. Sampling equipment (i.e., submersible pump, control box, generator, etc.)
    ii. AC Voltage Detector
2. ERM personnel may not perform LO/TO unless they have been authorized by ERM to do so, including attending ERM LO/TO training.

REFERENCES

Regulatory References

None

Technical References

Grundfos, 2006. *SQ, SQE Installation and Operating Instructions*. May.

REVISION LOG

DATE	REV. #	APV'D	COMMENTS
5/3/2011	0		
5/23/11	1		Incorporated comments from ERM internal review team

North America Job Hazard Analysis
Operating Vehicles

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 3	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Operating vehicles for work, including personal vehicles, company-owned non-commercial small trucks, and rental vehicles.

Hazard Analysis:

Task Step	Hazard	Control Measures
Inspect the Vehicle	Tire pressure, brakes, steering, headlights and other vehicle equipment malfunction can contribute to vehicle accidents and property damage. Loose articles inside the vehicle and carried in truck beds or on trailers can shift and cause distractions or traffic accidents.	Use the "ERM Vehicle Safety Form" to document daily inspections of the vehicle. In certain cases, a client-required form may be used instead. Do not operate any vehicle if its safety is in question. During vehicle inspection make sure any loose articles either inside the vehicle or in truck beds/on trailers are well-secured.
Get in and out of the Vehicle	Hands, hair, or loose clothing can be caught in doors, trunk covers, and other vehicle equipment, causing injury.	When entering or exiting a vehicle, pay attention to what you are doing. ERM has had incidents occur simply from being rushed and not paying attention during vehicle entry/exit.

North America Job Hazard Analysis
Operating Vehicles

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 3	

Task Step	Hazard	Control Measures
Drive the Vehicle	Operating a vehicle presents many different hazards to employees that must be simultaneously mitigated.	Only allow ERM employees to drive motor vehicles (authorized employees with a current drivers license). Before moving vehicles always put your seat belt on, and stop using handheld electronics. Make sure any food or drink is secured and any electronics are programmed (GPS). When moving vehicles, follow all posted speed limits and posted signs. Do not pick up hitch-hikers, and never transport people in truck beds.
Driving when Fatigued	Operating a vehicle after a full day of work or when you are fatigued drastically decreases focus and response time, and increasing the risk of being involved in a vehicle accident.	Avoid driving more than 8 hours in one workday. If the number of hours driving to/from a jobsite combined with the number of hours to be worked on the site will equal more than 14 total hours, alternate arrangements should be arranged. Be aware of your fatigue level while driving and stop to rest if you feel overly tired.
Stay Focused on the Road	Doing anything that distracts you from the road for more than 2 seconds highly increases the risk of being involved in a vehicle accident. In particular, driver inattention due to hand-held mobile phone use is currently thought to be responsible for approximately 80% of all vehicle accidents.	Do not operate a hand-held mobile phone while driving. Use a hands-free mobile solution instead, such as a Bluetooth headset or hardwired earpiece. In some cases, all mobile phone use while driving (including answering and dialing), may be prohibited by our client. Do not perform activities while driving that will take your attention off the road for more than 2 seconds. A few of these types of activities could include programming GPS', applying makeup, changing the radio, or eating while driving. When these sorts of activities must be performed, pull to the side of the road and stop.

North America Job Hazard Analysis
Operating Vehicles

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 3	

Task Step	Hazard	Control Measures
Pull a Trailer	Many drivers are unfamiliar or inexperienced with pulling trailers, increasing the risk of being involved in a vehicle accident.	If you are uncomfortable pulling a trailer do not do so. Arrange for an alternate, experienced driver. Be aware that it takes longer to speed up and slow down when pulling a trailer, and that visibility may be reduced significantly. Make sure your vehicle is capable to pull the weight of the trailer and its contents. Inspect the trailer to ensure brake and turn signals work properly and in concert with the main vehicles signals, and that tire pressure is acceptable. Make sure trailer is attached securely to the main vehicle and the safety chain or other backup attachment device is in-place. Evenly distribute weight on any trailers pulled.
Leaving the Vehicle	Leaving personal valuables and company equipment/documents in abandoned vehicles may attract thieves.	Turn off the engine and lock any vehicle being left for even a short period of time when not on a secure jobsite. If the vehicle will be left for long periods or overnight, remove any company documents, computers, and equipment, personal valuables, or any items that would attract thieves.
Report and Document Vehicle Accidents and Property Damage	Improper documentation of vehicle accidents and property damage caused by vehicle operation place ERM at risk.	No matter how minor a vehicle accident or property damage event is, report it as a safety event. If involved in a vehicle accident, always call the police so a report will be available, to protect your liability, and to protect ERM liability. Take as many pictures as you can of the accident scene if you can do so without placing yourself in further danger.

North America Job Hazard Analysis
Operating Vehicles

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 3	

Task Step	Hazard	Control Measures
Drive a Commercial Vehicle	Driving vehicles alone or in combination (with a trailer, for example) with Gross Motor Vehicle Weight (GMVW) greater than 10,000 pounds carries additional regulatory requirements. Not addressing these requirements places ERM at risk.	Check the plaque on the inside of the driver-side door for the GMVW. If the weight is greater than 10,000 pounds contact a member of the North America Safety Team for further assistance. Do not operate the vehicle unless you have received proper training and have required supplies (such as logbooks).
Rent a Vehicle	Only certain car rental agencies have negotiated contracts, rates, and insurance coverage with ERM. Renting a vehicle from another agency exposes you and ERM to unnecessary liability and risk.	If possible, rent vehicles using the Cain Travel website, and from an ERM authorized car rental agency. If not possible to rent from one of these, you must purchase collision damage and personal accident insurance at the time of rental. Currently, authorized rental car agencies include: • Enterprise Car Rental • Hertz Car Rental

Personal Protective Equipment Required for this Task:

Type	Description
Vehicle Safety Kit for Personal or Company-Owned Vehicles	Includes small fire extinguisher (ABC), first aid kit, spare tire/jack, jumper cables, flashlight, flares or lighted triangles, reflective vest, and disposable or digital camera (for documenting accidents)

Training Required for this Task:

Type	Description
ERM Safe Driving	E-learning course instructing employees on ERM vehicle safety policy and practice.

Forms Associated with this Task:

Type	Description
ERM Vehicle Safety Form	Includes items that should be inspected regularly on motorized vehicles.

North America Job Hazard Analysis
Work in Active Facilities

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.:4	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

General guidelines for working safely in facilities where active operations are occurring and other personnel are performing work

Hazard Analysis:

Task Step	Hazard	Control Measures
Plan ahead for the site visit	Operational and safety items unplanned for prior to visiting the site can cause significant delay	Know ahead of time where any specific parking and entry locations are, as well as training or drug testing required prior to site entry. Ask your site contact/escort to explain any pre-entry requirements. Have the following personal protective equipment with you and wear it while working: • Steel-toe boots • Long pants • Safety glasses • Hard hat • Safety goggles (if splash hazards exist) • Chemical resistant gloves (if needed)

North America Job Hazard Analysis
Work in Active Facilities

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.:4	

Task Step	Hazard	Control Measures
Perform Site Work	Employees may encounter moving vehicles/trucks/forklifts.	Be aware of traffic patterns on the site, including designated forklift lanes.
	Employees may be exposed to chemicals.	Include chemicals known to pose health risks in your WARN HASP for the site, and determine their exposure limits.
	There may be uneven terrain, unguarded holes or wall openings, and other slip, trip, and fall hazards.	For any fieldwork, wear steel-toe boots with enough ankle support. If an area is overly cluttered, poorly lit, or posted signs indicate these hazards, avoid the area if possible.
	A site emergency may happen while you are working onsite.	List the facility emergency planning information in the WARN HASP and have a copy of it with you at all times. Stay with your site escort at all times.
	You may encounter confined spaces.	If you encounter posted signs stating "DANGER – Confined Space – Do Not Enter", do not enter the space. Be alert to other areas where entry or exit appears to be limited.
	High noise levels may be present.	If a noise dosimeter is not available, use the following rule of thumb. If you are standing close to another person and have to raise your voice to be understood by them, hearing protection is needed.
	Highly mechanized equipment may be present in the area, posing electrical hazards and pinch hazards.	Do not touch plant equipment unless you verify it is not powered and permission has been given to you.

North America Job Hazard Analysis
Work in Active Facilities

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.:4	

Task Step	Hazard	Control Measures
Working Alone	Any injury or illness that occurs to an employee working alone can become very serious if they are not able to reach another person for assistance.	If a Level 2 or 3 WARN HASP has been prepared, do not work alone. If working alone is authorized, establish a communication plan in your WARN HASP and follow it completely. Also stay in close communication with your site contact/escort. If you become ill or injured when working alone, immediately call 911 for serious emergencies, or WorkCare's Incident Intervention service for other types of illnesses or injuries. The WorkCare Incident Intervention phone number is 1-800-II-XPRTS. Know the contact information and route to the nearest medical facility.

Personal Protective Equipment Required for this Task:

Type	Description
None	

Training Required for this Task:

Type	Description
None	

Forms Associated with this Task:

Type	Description
Work in Active Facilities Checklist	Checklist covering items associated with working in active facilities. The checklist may be used to perform pre-job risk assessment.
WorkCare Incident Intervention Wallet Card	Wallet-sized card to be carried by all ERM employees containing contact information for the Incident Intervention service.

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.:4	

WorkCare Incident Intervention Wall Poster	11″ x 17″ poster containing contact information for the Incident Intervention service. This poster should be displayed in each permanent office location and in short-term field office locations.

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
ERM Actions During Subsurface Clearance and Drilling

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 6	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

General guidelines for working safely when performing any ground penetrating activities (excluding surface soil sampling) and ERM personnel activities during overseeing drilling.

Hazard Analysis:

Task Step	Hazard	Control Measures
Identify a Client Contact Person	Client contacts that are not familiar with the site layout could cause critical information to be missed during safety planning.	Determine degree of knowledge of our client contact by evaluating their current job duties at the site, length of time they have worked at the site, and time in their current job. If the ERM team does not feel comfortable with the level of experience of our client contact, take additional measures to ensure all pertinent subsurface utilities and services information is gathered.
Engage Subcontractors	Subcontractors who have not been evaluated against ERM minimum safety standards or who do not meet minimum safety standards may pose more risk.	Use only ERM subcontractors who are identified as having met our minimum safety standards. In cases where using an already-qualified subcontractor is not possible, ensure extra precautions are taken to provide safety oversight to the work.
Appoint an ERM Subsurface Clearance "Experienced Person" to the project	ERM employees who are not experienced with SSC issues may not recognize critical zones or clues to other site utilities/services.	Ensure a "SSC Experienced Person" is assigned to the project to provide oversight of ground penetrations and to mentor less experienced ERM employees.

North America Job Hazard Analysis
ERM Actions During Subsurface Clearance and Drilling

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 6	

Task Step	Hazard	Control Measures
Gather site-specific subsurface information	Incomplete or inaccurate site utility/service drawings may lead the ERM project team to incorrect conclusions regarding what utilities/services are onsite.	Obtain the most recent "as-built" drawings and additional site information such as easements, rights-of-way, historical plot plans, etc. to assist making decisions about other actions that will be required at the site.
Develop the HASP	Using incorrect documents in safety planning may lead to not considering all pertinent information.	A Level 2 WARN HASP for Intrusive Work (minimum) must be used when performing any ground penetrations, with the exception of surface soil sampling. The Level 2 HASP contains a "Site Services Model" that ERM uses to evaluate SSC hazards.
Develop the Site Services Model	Critical zones and a whole-site view of utilities and services at the site are more difficult to do if not put into the Site Services Model.	Use the Site Services Model to identify gaps in knowledge from all drawings and other verbal information from our client contact. Identify locations of key isolation and shutoffs closest to the work area for each type of utility/service.
Make Preliminary Determinations	Not recognizing or identifying critical zones poses great hazard to ERM employees in the field from contact with electricity or other utilities.	Establish critical zones and excavation buffers (if needed) for the work. Initial critical zone determinations may change in the field but are a good starting point in hazard identification.
Identify Preliminary Ground Disturbance Locations	Planning ground disturbance locations inside critical zones poses great hazard to ERM employees in the field from contact with electricity or other utilities.	Ensure critical zones have been identified using the Site Services Model and then identify locations outside those critical zones up-front, if possible. If a ground disturbance inside a critical zone is absolutely necessary, notify the site PIC and obtain guidance from him/her before proceeding.
Public and/or Private Utility Markout	Not having utilities marked may lead to a subsurface clearance strike.	Contact public and private utility markout services giving them enough time to respond. A minimum of 24-hour notification to utility locators is required in most states, and may vary higher in some states.
Conduct the Site Walk	Inexperienced people conducting the site walk may miss pertinent information regarding utilities and/or services.	The "SSC Experienced Person" must lead the site walk and should be accompanied by our client contact. Each ground disturbance location should be approved by our client contact (written approval preferred, verbal approval acceptable).

North America Job Hazard Analysis
ERM Actions During Subsurface Clearance and Drilling

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 6	

Task Step	Hazard	Control Measures
Inspect Each Ground Disturbance Location	Inexperienced people conducting inspection may miss pertinent information regarding utilities and/or services.	The "SSC Experienced Person" must lead inspection of each Ground Disturbance Location. Any visual clues of subsurface obstruction/utilities should be documented. Critical zones may have to be reassessed at this point. Use the SSC Checklist to document this inspection for each point inside a critical zone, at a minimum.
Finalize Critical Zone Determinations	Not performing this verification step in the field may lead to a SSC strike.	Use information gathered during pre-planning, utility markout, and site walk/inspection to verify critical zones that have been previously established. Revise critical zones as necessary. Use the SSC Checklist to document points inside critical zones. If points are confirmed inside critical zones, either step out and relocate the ground disturbance location, or contact the PIC for additional guidance.
Oversee setup of drilling equipment	Overhead electrical/other lines may come in contact with drill rigs. Materials stored in the vicinity of drill rigs may pose various hazards to employees.	Ensure drill rigs are set up in areas where they will not contact overhead lines when being positioned. The minimum distance for drill rig clearance is 25 feet unless special permission is granted by the utility company. When a drill rig must be maneuvered in tight quarters, the presence of a second person is required to ensure adequate clearance. If backing-up is required, two ground guides will be used: one in the direction the rig is moving and the other in the operator's normal field of vision. Move tools, materials, cords, hoses, and debris to prevent trip hazards and contact with moving drill rig parts. Secure tools and equipment subject to displacement or falling. Store any flammable materials away from ignition sources and in approved containers.

North America Job Hazard Analysis
ERM Actions During Subsurface Clearance and Drilling

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 6	

Task Step	Hazard	Control Measures
Physically Clear all Ground Disturbance Locations	Employees performing physical clearance could contact underground utility/service lines.	Use cable avoidance tools at each location that must be physically cleared (OSHA requirement). If using a hand-auger, ensure insulated handles are in-place before their use.
	Drill rig could damage electrical/utility/service lines if not physically cleared first.	Mechanical ground penetration should not commence until a ground disturbance location is physically cleared. In certain situations drilling may occur without physical clearance – consult with the project PIC prior to making this determination.
Commence Drilling Operations	Rotating equipment could pull employees into equipment.	Do not wear loose or frayed clothing, loose long hair, or loose jewelry while working around rotating equipment. Tuck shirt-tails into pants. Never walk directly behind or beside drill rigs without the drill rig operator's knowledge. Keep all non-essential personnel out of the drill rig work area.
	Poorly functioning drill-rig equipment could expose employees to hazardous conditions.	Ensure drill rigs and other machinery used is inspected daily by competent, qualified individuals. Instruct drill rig operators to report any abnormalities such as equipment failure, oozing liquids or unusual odors so they can be dealt with before proceeding with work. Do not eat, drink, or smoke near the drill rig.
	Noisy environments may make it difficult to communicate by vocal means.	Wear hearing protection at all times when in the vicinity of the drill rig, or when you must raise your voice to be heard by co-workers. Maintain visual contact with the drill rig operator at all times and establish hand-signal communications for use when verbal communication is difficult.

North America Job Hazard Analysis
ERM Actions During Subsurface Clearance and Drilling

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 6	

Task Step	Hazard	Control Measures
Complete Drilling Operations	Equipment allowed to remain running poses pinch-point and potential explosion hazards to employees.	Shut down drill rigs before repairing or lubricating parts (except those that must be in motion for lubrication). Shut down mechanical equipment prior to and during fueling operations. When refueling or transferring fuel, containers and equipment must be bonded to prevent the buildup of static electricity.

Personal Protective Equipment Required for this Task:

Type	Description
Insulated hand-augers	Hand-augers fitted with rubber handles, or other non-conductive material.

Training Required for this Task:

Type	Description
SSC Classroom Training	Initial classroom training detailing the ERM subsurface clearance process, tools, and forms.
SSC Experienced Person	At least one must be present on all sites involving SSC. The Experienced Person will both give SSC expertise in project execution and mentor less experienced employees.

Forms Associated with this Task:

Type	Description
SSC Checklist	Checklist detailing the ERM SSC process, and providing tools to ensure critical zones and excavation buffers are properly identified and validated in the field.
SSC Mentorship Card	The SSC Mentorship Card provides Experienced Persons with topics to be covered with less experienced employees on SSC sites, and also documents mentoring of the less experienced employees.
Daily Drill Rig Inspection Form	Form required to be used by ERM subcontractors to document daily inspection of drill rigs. This form should be provided by the drill rig operating company. Completed forms should be kept with the

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 6	

	HASP and filed in project files.

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
ERM Actions During Subsurface Clearance and Excavations

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 7	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

General guidelines for working safely when performing any ground penetrating activities (excluding surface soil sampling) and ERM personnel activities during overseeing excavations.

Hazard Analysis:

Task Step	Hazard	Control Measures
Identify a Client Contact Person	Client contacts that are not familiar with the site layout could cause critical information to be missed during safety planning.	Determine degree of knowledge of our client contact by evaluating their current job duties at the site, length of time they have worked at the site, and time in their current job. If the ERM team does not feel comfortable with the level of experience of our client contact, take additional measures to ensure all pertinent subsurface utilities and services information is gathered.
Engage Subcontractors	Subcontractors who have not been evaluated against ERM minimum safety standards or who do not meet minimum safety standards may pose more risk.	Use only ERM subcontractors who are identified as having met our minimum safety standards. In cases where using an already-qualified subcontractor is not possible, ensure extra precautions are taken to provide safety oversight to the work.
Appoint an ERM Subsurface Clearance "Experienced Person" to the project	ERM employees who are not experienced with SSC issues may not recognize critical zones or clues to other site utilities/services.	Ensure a "SSC Experienced Person" is assigned to the project to provide oversight of ground penetrations and to mentor less experienced ERM employees.

North America Job Hazard Analysis
ERM Actions During Subsurface Clearance and Excavations

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 7	

Task Step	Hazard	Control Measures
Gather site-specific subsurface information	Incomplete or inaccurate site utility/service drawings may lead the ERM project team to incorrect conclusions regarding what utilities/services are onsite.	Obtain the most recent "as-built" drawings and additional site information such as easements, rights-of-way, historical plot plans, etc. to assist making decisions about other actions that will be required at the site.
Develop the HASP	Using incorrect documents in safety planning may lead to not considering all pertinent information.	A Level 2 WARN HASP for Intrusive Work (minimum) must be used when performing any ground penetrations, with the exception of surface soil sampling. The Level 2 HASP contains a "Site Services Model" that ERM uses to evaluate SSC hazards.
Develop the Site Services Model	Critical zones and a whole-site view of utilities and services at the site are more difficult to do if not put into the Site Services Model.	Use the Site Services Model to identify gaps in knowledge from all drawings and other verbal information from our client contact. Identify locations of key isolation and shutoffs closest to the work area for each type of utility/service.
Make Preliminary Determinations	Not recognizing or identifying critical zones poses great hazard to ERM employees in the field from contact with electricity or other utilities.	Establish critical zones and excavation buffers for the work. Initial critical zone determinations may change in the field but are a good starting point in hazard identification.
Identify Preliminary Ground Disturbance Locations	Planning ground disturbance locations inside critical zones poses great hazard to ERM employees in the field from contact with electricity or other utilities.	Ensure excavation buffers have been identified using the Site Services Model and then identify locations outside those critical zones up-front, if possible. If a ground disturbance inside a critical zone is absolutely necessary, notify the site PIC and obtain guidance from him/her before proceeding.
Public and/or Private Utility Markout	Not having utilities marked may lead to a subsurface clearance strike.	Contact public and private utility markout services giving them enough time to respond. A minimum of 24-hour notification to utility locators is required in most states, and may vary higher in some states.
Conduct the Site Walk	Inexperienced people conducting the site walk may miss pertinent information regarding utilities and/or services.	The "SSC Experienced Person" must lead the site walk and should be accompanied by our client contact. Each ground disturbance location should be approved by our client contact (written approval preferred, verbal approval acceptable).

North America Job Hazard Analysis
ERM Actions During Subsurface Clearance and Excavations

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 7	

Task Step	Hazard	Control Measures
Inspect Each Ground Disturbance Location	Inexperienced people conducting inspection may miss pertinent information regarding utilities and/or services.	The "SSC Experienced Person" must lead inspection of each Ground Disturbance Location. Any visual clues of subsurface obstruction/utilities should be documented. Critical zones may have to be reassessed at this point. Use the SSC Checklist to document this inspection for each point inside a critical zone, at a minimum.
Finalize Critical Zone Determinations	Not performing this verification step in the field may lead to a SSC strike.	Use information gathered during pre-planning, utility markout, and site walk/inspection to verify critical zones that have been previously established. Revise critical zones as necessary. Use the SSC Checklist to document points inside critical zones. If points are confirmed inside critical zones, either step out and relocate the ground disturbance location, or contact the PIC for additional guidance.
Establish Excavation Buffers	Mechanical digging near subsurface structures not already designated for removal can expose employees to electrical or other serious hazards.	For at least 2 feet in all directions from an identified subsurface structure, use non-conductive tools and physically remove soil.
Notify Equipment Operators where Excavation Buffers are Located	Mechanical digging near subsurface structures not already designated for removal can expose employees to electrical or other serious hazards.	If physically clearing is performed, use cable avoidance tools at each location that must be physically cleared (OSHA requirement). If using a hand-auger, ensure insulated handles are in-place before their use. DO NOT DIG INSIDE AN EXCAVATION BUFFER WITH MECHANICAL EQUIPMENT.

Personal Protective Equipment Required for this Task:

Type	Description
Insulated hand-augers	Hand-augers fitted with rubber handles, or other non-conductive material.

North America Job Hazard Analysis
ERM Actions During Subsurface Clearance and Excavations

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 7	

Training Required for this Task:

Type	Description
SSC Classroom Training	Initial classroom training detailing the ERM subsurface clearance process, tools, and forms.
SSC Experienced Person	At least one must be present on all sites involving SSC. The Experienced Person will both give SSC expertise in project execution and mentor less experienced employees.

Forms Associated with this Task:

Type	Description
SSC Checklist	Checklist detailing the ERM SSC process, and providing tools to ensure critical zones and excavation buffers are properly identified and validated in the field.
SSC Mentorship Card	The SSC Mentorship Card provides Experienced Persons with topics to be covered with less experienced employees on SSC sites, and also documents mentoring of the less experienced employees.
Daily Excavation Inspection Form	Form required to be used by ERM subcontractors to document daily inspection of excavations. Completed forms should be kept with the HASP and filed in project files.

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Work in High Noise Environments

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 8	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for safe work in any environment with elevated noise levels.

Hazard Analysis:

Task Step	Hazard	Control Measures
Prepare for Work	Not having hearing protection or noise monitoring equipment could expose employees to unknown levels of elevated noise.	For work environments known or suspected to present elevated noise hazards, ensure hearing protection is procured and available at the jobsite. For any employee working on the site who has not attended hearing conservation training within the past year, review this JHA with them and document their training. Determine whether noise monitoring has been done on other projects with similar scopes of work by contacting your Safety Team representative. If work on the project will last 30 days or more, procure a noise dosimeter and perform personnel monitoring at the site to document noise levels.
Conduct the Work	Damage to hearing from sustained elevated noise or intermittent impact noise.	If noise dosimetry is not being conducted at the project, use the following rule of thumb to determine whether hearing protection is required: If you are standing within 3 feet of another person and have to raise your voice to be understood by them when talking, hearing protection must be worn.

North America Job Hazard Analysis
Work in High Noise Environments

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 8	

Task Step	Hazard	Control Measures
Report Dosimetry Monitoring Results	Lack of consolidated noise dosimetry monitoring results can result in other employees on different projects not being aware of typical noise levels.	OSHA allows noise dosimetry monitoring results collected when working with specific equipment to be used on any other project site where the same equipment is in-use. Report dosimetry monitoring results to your Safety Team representative so they can be included in a North America-wide listing of typical noise levels.

Personal Protective Equipment Required for this Task:

Type	Description
Hearing Protection	

Training Required for this Task:

Type	Description
Hearing Conservation	

Forms Associated with this Task:

Type	Description
None	

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Engaging and Managing Subcontractors

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 9	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for managing safety of ERM-hired subcontractors to ensure they work safely and ERM liability is minimized.

Hazard Analysis:

Task Step	Hazard	Control Measures
Choose Subcontractor to Perform Work	Lack of executed contractual documentation may increase ERM liability.	The project PIC and/or PM must ensure a signed, executed contract is in-place prior to subcontractors performing work on the jobsite for ERM.
	Insurance documents collected during the safety prequalification process may not be sufficient to meet specific client contractual requirements.	The project PIC and/or PM must ensure that insurance certificates on-file for subcontractors meet or exceed contractual insurance requirements mandated by ERM clients. If the insurance certificate on-file is out-of-date or does not represent sufficient coverage, the project PIC and/or PM must obtain an updated insurance certificate from the subcontractor prior to the subcontractor performing work on the jobsite for ERM.
	Selecting subcontractors that do not meet ERM minimum safety criteria can result in poor safety performance on ERM projects.	Consult the North America "Subcontractor Information" page and select a subcontractor that meets ERM minimum safety criteria. If selection of an already-prequalified subcontractor is not possible due to business considerations or client wishes, provide enhanced subcontractor oversight on the jobsite.

North America Job Hazard Analysis
Engaging and Managing Subcontractors

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 9	

Task Step	Hazard	Control Measures
Prepare Site HASP Documents	Not informing ERM-hired subcontractors of ERM safety requirements for their work may expose employees to hazardous conditions and cause unnecessary project delays.	The project PIC and/or PM must ensure the subcontractor has received a copy of the ERM HASP and supporting documentation prior to mobilization to the jobsite. The subcontractor must be made aware that their personnel must follow provisions in the ERM HASP at a minimum, but that they may not rely on ERM documents for their employee's health and safety protection.
	Not obtaining authorized subcontractor signatures on ERM HASPs may expose ERM to additional liability.	Prior to any jobsite work proceeding, obtain the signature of an authorized representative for the subcontractor on the ERM HASP. Also, have the subcontractor's authorized representative designate one of their employees, by name, to serve as the jobsite contact for ERM safety concerns. List the jobsite safety contact in the ERM HASP.
	The lack of a specific scope of work for an ERM subcontractor opens the possibility of whether ERM or the subcontractor is responsible for certain aspects of jobsite work.	Specify both the ERM and the subcontractor's scope of work in the ERM HASP document. Ensure that any subcontractor personnel on-site has reviewed and signed the site HASP.
	Any ERM attempt to author safety documents for use during completion of tasks on jobsites by subcontractors may not be sufficient to fully control site safety hazards posed by subcontractor work.	In all cases, require the ERM subcontractor to either develop their own site-specific HASP, or develop Job Hazard Analyses (JHA) for the specific tasks they will perform. Attach these documents to the ERM HASP as appendices.

North America Job Hazard Analysis
Engaging and Managing Subcontractors

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 9	

Task Step	Hazard	Control Measures
Conduct the Work	On jobsites where ERM uses subcontracted services, additional liability arising from the OSHA "Multi-Employer Worksite Rule" may be present.	Ensure subcontractor work is overseen by ERM personnel at all times. Whenever subcontractor personnel are present on a jobsite performing work, an ERM employee should be present and engaged in the work being performed. Always include subcontractor personnel in daily jobsite tailgate safety meetings and have them indicate their presence and understanding of the information presented by signing the ERM form documenting the meeting. ERM personnel at the jobsite should perform regular safety inspections of the site, including subcontractor activities. Any deficiencies noted during inspections should be forwarded to the subcontractor's jobsite safety contact for resolution and report-back to ERM. For imminent danger situations (those that may cause loss of life or limb), the ERM inspector should stop the subcontractor's work and ensure all on site retreat until the imminent danger hazard is abated. Do not supply subcontractor personnel with personal protective equipment (PPE). If PPE must be provided to subcontractors, ERM personnel must inspect the PPE and document the inspection prior to providing it to subcontractor personnel. If ERM is performing air monitoring for the subcontractor, ensure calibration of air monitoring equipment is done before and after each use. At a minimum, air monitoring equipment must be calibrated at least once per day. Document equipment calibration and file with the site HASP.

North America Job Hazard Analysis
Engaging and Managing Subcontractors

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 9	

Task Step	Hazard	Control Measures
After Job Completion, Forward Comments to ERM North America Safety Team	Obtaining services from subcontractors who have met ERM minimum safety criteria but have performed poorly on jobsites poses risk to ERM employees on future jobsites.	Submit any comments about the subcontractor's safety performance while working on the ERM jobsite to the ERM North America Safety Team. These comments will be stored in our database and provided to ERM PICs and/or PMs seeking quality subcontractors for future work.

Personal Protective Equipment Required for this Task:

Type	Description
None	

Training Required for this Task:

Type	Description
None	

Forms Associated with this Task:

Type	Description
Subcontractor Safety Prequalification Checklist	ERM form given to subcontractors that collects information necessary to determine whether the subcontractor meets ERM's minimum safety criteria.
Subcontractor Insurance Certificate	Subcontractor-supplied form issued by the subcontractor's insurance carrier or broker evidencing current insurance coverage.

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Engaging and Managing Subcontractors

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 9	

North America Job Hazard Analysis
Hazard Communication

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 10	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for communicating hazards posed by the storage and/or use of chemicals.

Hazard Analysis:

Task Step	Hazard	Control Measures
Storing Chemicals in the Office Setting	Chemicals stored in ERM offices or Field Project Offices may lead to employee chemical exposure, chemical spills, or fires from flammable materials.	If at all possible, do not store chemicals in the office environment. For each chemical product used by ERM employees or stored in an ERM field or office location, a MSDS sheet must be obtained and kept on-file. A chemical inventory list must be prepared and updated as new or different chemicals are procured. Chemical containers must be labeled in accordance with OSHA regulations. Train all employees who will use or be present in the general vicinity of chemicals annually about hazard communication. If new or updated chemicals are procured, hazard communication training must be given to affected employees prior to using or storing the chemical.

North America Job Hazard Analysis
Hazard Communication

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 10	

Task Step	Hazard	Control Measures
Using Chemicals	Employees may be exposed to chemical hazards via skin contact, ingestion, inhalation, or punctures in the skin.	Before using any chemical, make sure a jobsite WARN Health and Safety Plan (HASP) has been prepared and taken the chemical being used into account. Wear protective equipment as specified in the HASP. If chemicals are being used by subcontractors, ensure all employees on the jobsite have been told about the chemical in-use and are protected. If chemical exposure occurs, even if medical symptoms are not present, inform the Field Safety Office or Office H&S Contact.
Large Chemical Spills	Large chemicals spills may expose employees to significant health hazards.	For large chemical spills (generally anything larger than 1 gallon in size), HAZWOPER training is required to perform any action other than retreating from the area and contacting appropriately-trained personnel to mitigate the spill. Do not attempt to stop or clean-up a spill without current HAZWOPER training, current medical clearance, current respirator training, and a current respirator fit-test.

Personal Protective Equipment Required for this Task:

Type	Description
None	

Training Required for this Task:

Type	Description
Hazard Communication	An annually-required training discussing general chemical hazards, MSDS sheets, and how to respond to general chemical emergency situations.

North America Job Hazard Analysis
Hazard Communication

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 10	

Forms Associated with this Task:

Type	Description
Material Safety Data Sheet (MSDS)	An informational document containing information about chemical composition, hazardous properties, and steps to take in emergency situations involving chemicals.
International Chemical Safety Card	A chemical-specific document developed by the National Institute of Occupational Safety and Health providing abbreviated information similar to a MSDS.

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Airborne Contaminants and Reproductive Hazards

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 11	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Description of specific chemical air contaminants requiring additional regulatory actions.

Hazard Analysis:

Task Step	Hazard	Control Measures

North America Job Hazard Analysis
Airborne Contaminants and Reproductive Hazards

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 11	

Task Step	Hazard	Control Measures
Exposure to specific OSHA-regulated chemical hazards during work	Certain chemicals have been found to present more significant long-term health hazards to employees when they are exposed to them, including sensitization, development of certain cancers, and others.	If the following chemicals are being used on a jobsite, and work will occur for more than 30 consecutive days, OSHA regulations generally require a plan to mitigate exposures, additional training, and medical monitoring in some cases. • 13 carcinogens (see 29 CFR 1910. • Asbestos • Vinyl chloride • Inorganic arsenic • Lead • Hexavalent chromium • Cadmium • Benzene • Coke oven emissions • 1,2-dibromo-3-chloropropane • Acrylonitrile • Ethylene oxide • Formaldehyde • Methylenedianiline • 1,3-butadiene • Methylene chloride
Exposure to reproductive chemical hazards during work	Certain chemicals have been found to affect the reproductive systems in males and females and require additional personnel protection if used.	Chemicals posing reproductive hazards will be specified in site-specific HASPs. Follow all provisions of the HASP to minimize or eliminate exposure to reproductive hazards.

Personal Protective Equipment Required for this Task:

Type	Description
Varies	PPE varies depending on the specific chemical being used. Consult the HASP for jobsite-specific guidance.

North America Job Hazard Analysis
Airborne Contaminants and Reproductive Hazards

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 11	

Training Required for this Task:

Type	Description
Varies	Training that must be given to employees varies on the specific chemical being used. Consult the HASP for jobsite-specific guidance.

Forms Associated with this Task:

Type	Description
None	

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Personal Protective Equipment

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)

JHA No.: 14

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:
Guidelines for selection and use of personal protective equipment (PPE). PPE is only to be used after engineering and administrative controls have been considered and found to be non-feasible. Guidance for respiratory protection and fall protection is included in separate JHAs

Hazard Analysis:		
Task Step	**Hazard**	**Control Measures**
General fieldwork	A head injury could occur from a falling or flying object, or a head injury could be sustained from bumping into something. Wearing a "typical" hardhat around electrical equipment may result in electrical shock.	A hard hat meeting the American National Standards Institute (ANSI) Z-89.1 standard must be worn. These hardhats contain an inner suspension system that should be checked regulatory to ensure straps are not worn and that space exists between the shell of the hardhat and the suspension straps. Electrical shock protection hardhats – Class A for low voltage (up to 2,200 volts), Class B for high voltage (up to 20,000 volts), and Class C for no electrical shock protection.
General fieldwork	A foot injury could occur from a falling or rolling object, or an object may pierce the sole of the shoe. Electrical shock may occur with steel-toe boots.	Steel toe protective footwear should be worn that meets or exceeds the American Society for Testing and Measurement (ASTM) F2413-05 standard. Footwear worn around electrical circuits should also be non-conductive.

North America Job Hazard Analysis
Personal Protective Equipment

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 14	

Task Step	Hazard	Control Measures
Cutting by hand	Hand injury could occur from handling an object with sharp edges of a fixed open-blade knife.	Fixed open-blade knives (such as pocket knives) may not be used on ERM jobsites, with few exceptions. If their use is required, cut-resistant gloves (such as Kevlar) must be worn and the PM or FSO must be informed prior to their use. Employees performing significant amounts of cutting tool use should wear high-visibility gloves to encourage awareness of where hands are being placed.
Handling chemicals by hand	Dermal exposure to hands from chemicals during soil and/or groundwater sampling.	Wear nitrile or latex protective gloves when handling sample media. Double-layering these gloves is a good idea for added protection. If acidic or caustic chemicals are present, wear outer neoprene or rubber gloves.
O&M or Subsurface Injection	Dermal exposure to body from chemicals during operations and maintenance activities or subsurface liquid injection activities.	When working with commercial, full-strength chemicals ensure splash protection is worn (such as a polyethylene coated suit) and that gloves and boots are taped to the suit to prevent liquid splash.
General fieldwork Work around liquid splash and/or flying particle hazards	Foreign object or liquid splash to the eye.	Safety glasses conforming to the ANSI Z-87 standard must be worn for field activities. Safety glasses are appropriate for use when general eye protection is needed. For liquid splash hazards or hazards from flying particles, tight-fitting safety goggles should be worn. A faceshield should be considered for use when splash hazards from commercial, full-strength chemicals.
Work around active roadways	Struck by moving vehicles when working outside or along a roadway.	High-visibility safety vests should be worn when working in parking lots or by active roadways. Class I may be used when traffic is below 25 mph, Class II for 25-50 mph, and Class 3 for >50 mph.

North America Job Hazard Analysis
Personal Protective Equipment

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 14	

Task Step	Hazard	Control Measures
Work in high noise environments	Hearing damage from noise exposure greater than 85 decibels.	Attempt to perform work when elevated noise is not an issue. If work must be performed during high noise, wear hearing protection in the form of earplugs or earmuffs. Further details are given in the "Work in High Noise Environments" JHA.
O&M or Lockout/Tagout/Tryout	Electrical shock	Lockout/tagout/tryout should be performed by licensed electricians or others that have been specifically authorized by ERM to do so. PPE appropriate to this work includes a cotton t-shirt, Class II Electrical Arc Protection suit, Class O (low voltage) gloves, and non-conductive footwear.

Training Required for this Task:

Type	Description
Personal Protective Equipment	PPE training, normally included in 8-hour refresher training, provides guidance on the selection, inspection, use, maintenance, and decontamination of different types of PPE

Forms Associated with this Task:

Type	Description
None	

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Work in Cold Environments

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 16	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for working in areas where cold stress may occur.

Hazard Analysis:

Task Step	Hazard	Control Measures
Drilling Oversight	Cold Weather	Dress Appropriately (gloves, hat heavy coat), If you become cold take a break inside building or car to warm up, Monitor Weather.
Excavation Oversight	Cold Weather	Dress Appropriately (gloves, hat heavy coat), If you become cold take a break inside building or car to warm up, Monitor Weather.

Personal Protective Equipment Required for this Task:

Type	Description
Level D	

Training Required for this Task:

Type	Description

North America Job Hazard Analysis
Work in Cold Environments

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)

JHA No.: 16

None

Forms Associated with this Task:

Type	Description

None

Site-Specific Job Hazard Analysis Completed by:

Name	Date
Gene Gabay	1/19/2011

North America Job Hazard Analysis
Respiratory Protection

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)

JHA No.: 17

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for selection, use, and maintenance of respiratory protection.

Hazard Analysis:

Task Step	Hazard	Control Measures
Offsite Preparation	Employee chemical exposure could occur or unqualified personnel could be put at risk if not specified early in the planning process.	The health and safety plan must specify the need for respirators, including the requirement that employees working on the project must be medically cleared to wear a respirator and have a current respirator fit-test on the type and model respirator they will be expected to wear. If organic vapor cartridges are to be used, develop a cartridge change schedule. Include the following exposure limits for each contaminant if they are available. The lowest exposure limit of these should be used as the trigger to don respiratory protection: • OSHA Permissible Exposure Limit (PEL) • NIOSH Recommended Exposure Limit (REL) • ACGIH Threshold Limit Value (TLV) • Immediately Dangerous to Life or Health (IDLH) Additionally, respirator cartridge types must be specified in the health and safety plan and available on-site.

North America Job Hazard Analysis
Respiratory Protection

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 17	

Task Step	Hazard	Control Measures
Prior to Using Respirator	Respirators that are not cleaned, inspected, or maintained well will not provide protection as designed.	Prior to donning a cartridge-type respirator, inspect to ensure it is in good condition, including straps, rubber sealing surfaces, and non-visible parts such as inhalation and exhalation valves. Do not use respirators with cracked rubber parts or stretched straps unless repaired. Clean if necessary using an alcohol wipe or mild soap and water solution. Cartridge-type respirators may not be used if chemical exposures exceed 10 times the OSHA PEL or are at IDLH levels. Inspect supplied air (SCBA at least monthly, and prior to each use. Inspections of SCBAs and other emergency-type respirators must be documented.
Don the Respirator	Incorrect seal on the respirator could cause employee chemical exposures.	Prior to donning respirators, personnel must be clean-shaven in areas of the face where the respirator seal touches, including any inner nose cups. For cartridge-type respirators, place the cartridges on the respirator facepiece. Cartridges should not be torqued to tighten (only slightly tightened). The respirator must be donned prior to other personal protective equipment in the head/neck area so that nothing comes between the respirator straps and the head surface. Safety glasses, hard hats, etc. must be donned after the respirator. Because of this, ERM prefers employees wear full-face respirators when possible. For cartridge-type respirators, perform a positive and negative fit-check to make sure the seal of the respirator is good.

North America Job Hazard Analysis
Respiratory Protection

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 17	

Task Step	Hazard	Control Measures
Performing Work Wearing Respirators	Tendency to readjust respirator facepieces when sweating is high, and can result in chemical exposures.	Excessive sweating may cause the respirator facepiece to slide on the wearer's face resulting in a compromised respirator seal. If this occurs, stop work and move to an area with no chemical contamination (go through the decontamination line if present), readjust the respirator, and perform positive and negative fit-checks to ensure a proper face seal.
	Particulate cartridge clogging may occur, or chemicals may break through chemical cartridges.	If using particulate cartridges (N, R, or P-types), and it becomes difficult to breathe, move to a clean area and change cartridges. If using chemical cartridges other than organic vapor-types, change cartridges if any amount of chemical odor breaks through the respirator cartridge. For organic vapor cartridges, change respirator cartridges according to the cartridge change schedule in the health and safety plan.
Doffing Respirators	Chemical exposure could occur if respirators are taken off incorrectly.	If a decontamination line is present, proceed through the line as directed. If no decontamination line is being used, all other personal protective equipment except gloves should be removed before taking the respirator off. Once removed, respirator cartridges should be discarded and facepieces cleaned. If sharing respirators, the respirator must be cleaned and sanitized before use by another employee.

Personal Protective Equipment Required for this Task:

Type	Description
None	

North America Job Hazard Analysis
Respiratory Protection

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 17	

Training Required for this Task:

Type	Description
Respirator Training	Annually-required training necessary for employees to wear positive or negative-pressure respirators.
Respirator Fit-Test	An annually-required test of the fit of a certain model and type respirator to an employee's face. All negative-pressure (filter or cartridge-type) and supplied-air facepieces must be fit-tests. Employees must be fit-tested on each model and type of respirator to be worn.

Forms Associated with this Task:

Type	Description
SCBA Inspection Checklist	Checklist documenting monthly inspection of self-contained breathing apparatus units (SCBA).

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Forklift Operations

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 18	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for working around forklifts.

Hazard Analysis:

Task Step	Hazard	Control Measures
Offsite Preparation	Forklift use poses significant hazards to operators and employees.	It is ERM policy and practice that our employees do not operate forklifts except in unusual circumstances. The health and safety plan must contain provisions for forklift operation or oversight of forklift operations. All forklift operators must be trained and certified to operate forklifts in accordance with 29 CFR 1910.178. Evidence of training and certification must be supplied to ERM and kept in project files.
Pre-Use Inspection	Critical safety equipment in disrepair poses significant contact hazards for operators and employees.	Daily, prior to operation, forklifts must be inspected for conditions that adversely affect the safety of the forklift. Any forklift found to be unsafe shall have the ignition key removed and be tagged "OUT OF SERVICE" until repaired.

North America Job Hazard Analysis
Forklift Operations

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 18	

Task Step	Hazard	Control Measures
Forklift Operation	Tip-over and other significant hazards are posed by improper forklift operation.	Lifting capacity of forklifts may not be exceeded for any reason. The lifting capacity of the forklift is located on a plate attached to the forklift. Unstable loads must be made stable prior to lifting. Personnel may not ride forklifts except in approved cages or platforms. All personnel driving or riding forklifts must wear seatbelts. Forklifts should be driven slowly around turns and curves due to having a high center of gravity. Forklifts should always travel in reverse when going down inclines. In all cases the operator line-of-sight must be in the direction of travel – the head should be turned when backing down an incline. When carrying a raised load, do not drive on a slope and come to a complete stop before changing directions. All driving on slopes should be done perpendicular to the slope.
Ending Forklift Operation	Forklifts left in "non-zero energy" position could injure employees.	Always bring raised loads or empty forklift tines to ground level when operation of the forklift is done for the day and remove keys. For forklifts using LP Gas, the gas tank should be removed and stored in a designated storage area.

Personal Protective Equipment Required for this Task:

Type	Description
None	

North America Job Hazard Analysis
Forklift Operations

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 18	

Training Required for this Task:

Type	Description
Forklift Operation	Classroom training teaching the basics of operating forklifts.
Forklift Operator Certification	Road-test where forklift operator's driving skills are critiqued.

Forms Associated with this Task:

Type	Description
Daily Forklift Inspection Checklist	Inspection form to be used daily prior to operating forklifts. All major safety-related components are included in the inspection.

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Heavy Equipment Operations

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 19	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for working around heavy equipment.

Hazard Analysis:

Task Step	Hazard	Control Measures
Offsite Preparation	Untrained workers operating heavy equipment pose potential life-threatening hazards to employees.	ERM policy and practice is that our employees do not operate heavy equipment except in unusual circumstances. If ERM personnel are to operate heavy equipment, this must be stated in the health and safety plan for the project. Only employees with training and/or demonstrated experience operating heavy equipment may do so. Subcontractor personnel operating heavy equipment must be trained and/or have demonstrated experience operating such equipment. ERM must be in possession of evidence of training and/or experience prior to Subcontractor personnel operating such equipment. All heavy equipment must meet applicable design standards (ANSI, etc.). A copy of the operating manual must be carried on all heavy equipment, including a load-rating chart and any special operating considerations.

North America Job Hazard Analysis
Heavy Equipment Operations

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 19	

Task Step	Hazard	Control Measures
Heavy Equipment Operation	Injury to operator and those in immediate vicinity.	Before starting operations, operators must ensure no one is working on or near machinery. If equipment is to be operated in close proximity to other workers, a spotter must be working in tandem with the operator. All heavy equipment must be inspected daily to ensure good working order. Critical safety items, such as brakes, backup alarms, horns, etc. must be in working order. Machinery with critical safety items in disrepair may not be used until they are fixed. Operators must operate equipment while wearing seatbelts, if provided, and at reasonable speeds. Mounting/dismounting a moving machine is prohibited. Do not transport personnel or equipment in machinery not designed for this purpose. Overhead obstructions must be assessed before operating machinery. If equipment is to be operated in close proximity to overhead obstructions, a spotter must be working in tandem with the operator. Safe working distances must be specified in the health and safety plan or JHA supplied by the subcontractor.
Ending Heavy Equipment Operations	Leaving equipment in a non-neutral position poses contact hazards.	All heavy equipment must be placed in a neutral position when not in operation. Dump truck beds must be lowered, buckets must be at ground level, forklift tines must be at ground level, etc. Keys must be removed from all heavy equipment when not in use4.

North America Job Hazard Analysis
Heavy Equipment Operations

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 19	

Personal Protective Equipment Required for this Task:

Type	Description
High-visibility safety vest	Vest worn by equipment operators and those working in the area impacted by moving machinery

Training Required for this Task:

Type	Description
Heavy Equipment Operation	Operators must be trained and/or have demonstrated experience for each type of heavy equipment they will operate.

Forms Associated with this Task:

Type	Description
Heavy Equipment Inspection form	Form for documenting daily heavy equipment inspections

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Portable Hand and Power Tools

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 20	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for working with portable hand and power tools.

Hazard Analysis:

Task Step	Hazard	Control Measures
Gather tools to take to jobsite	An improper tool available at jobsites encourages unsafe behaviors and could lead to injury.	Ensure tools taken to jobsites are kept in optimal condition (sharp, clean, oiled, etc.) to ensure efficient operation. Tools must only be used for their intended purposes – tools should not be used as pry-bars. Ensure power cords attached to powered-equipment are not damaged. Any damaged tool or electrical cord must be tagged and taken out of service.
Using cutting tools	Major and/or minor cuts to personnel	Fixed open-blade knives (such as pocket knives) may not be used on ERM jobsites, with few exceptions. If their use is required, cut-resistant gloves must be worn while using them and the PM or FSO must be informed prior to their use. Employees performing significant amounts of cutting tool use should must high-visibility gloves to encourage awareness of where hands are being placed.

North America Job Hazard Analysis
Portable Hand and Power Tools

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 20	

Task Step	Hazard	Control Measures
Using screwdrivers	Puncture injuries	Do not hold objects in the palm of your hand and press a screwdriver into it – these objects should be placed on a flat surface. Do not use screwdrivers as hammers, or use screwdrivers with broken handles. Use insulated screwdrivers for work on electrical equipment.
Using hammers	Creation of sparks	Use brass hammers in areas where creating sparks would pose ignition hazards.
	Particles may lodge in employee's eyes	Always use safety glasses when striking any object with a hammer. If hammer-head shows signs of mushrooming, replace it immediately.
	Loose handles may create a projectile hazard	Replace any hammer with a loose handle so the hammer-head does not detach and cause injuries.

Personal Protective Equipment Required for this Task:

Type	Description
High-visibility glove	Gloves typically in fluorescent green, orange, or yellow.
Cut-resistant glove	Limited protection is afforded by leather gloves from cuts. Kevlar gloves provide more protection when significant cut/puncture hazards exist.

Training Required for this Task:

Type	Description
None	

North America Job Hazard Analysis
Portable Hand and Power Tools

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 20	

Forms Associated with this Task:

Type	Description
None	

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Confined Space Entry Operations

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 21	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for permit-required and non permit-required confined space entry operations.

Hazard Analysis:

Task Step	Hazard	Control Measures
Offsite Preparation	Entering confined spaces poses various life-threatening hazards to employees.	ERM policy and practice prohibits our employees from entering a permit-required confined space, except in unusual circumstances. If permit-required confined spaces are to be entered by either ERM personnel or Subcontractor personnel, a North America Safety Team member must be consulted, and a confined space entry program must be instituted.
Onsite Work	Entering confined spaces poses various life-threatening hazards to employees.	Any person entering a permit-required confined space must have received confined space entry training. For subcontractors performing confined space entry, a minimum of three subcontractor personnel are required for this task (supervisor, attendant, and entrant).

Personal Protective Equipment Required for this Task:

Type	Description
None	

North America Job Hazard Analysis
Confined Space Entry Operations

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 21	

Training Required for this Task:

Type	Description
Permit-Required Confined Space Entry	Training on confined space entry operations, normally lasting 16-24 hours.

Forms Associated with this Task:

Type	Description
None	

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Energized Equipment and Lockout-Tagout

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 22	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for working on or around electrically energized equipment.

Hazard Analysis:

Task Step	Hazard	Control Measures
Offsite Preparation	Locks, tags, and trained personnel may not be present at the jobsite when needed.	The health and safety plan for projects involving work on or oversight of work on electrical equipment must include provisions for lockout-tagout. Locks and tags must be on-hand. Also, after-hours contact information for employees that will apply locks and/or tags must be obtained and documented in the health and safety plan. Personnel performing lockout-tagout operations must have received documented lockout-tagout training. Staff these projects with personnel who have attended this training. Collect training certificates from subcontractors who will perform this work.

North America Job Hazard Analysis
Energized Equipment and Lockout-Tagout

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 22	

Task Step	Hazard	Control Measures
Work on Energized Equipment	Electrocution may occur if lockout-tagout is not performed correctly.	Before working on electrically-energized equipment, it should be brought to a "zero-energy state". This may involve turning the equipment's power source off, or turning specific electrical breakers to the off position. "Zero-energy" is not attained until the individual working on the machinery attempts to turn the machine on and is unsuccessful. The individual(s) performing lockout-tagout must inform other personnel in the area that work on equipment is about to occur, and to not attempt to turn equipment on for any reason. Locks AND tags must be placed on equipment power sources by each individual performing work on the equipment using personally-identifiable locks. Tags must read "DANGER – DO NOT OPERATE" and be resistant to wear and tear by the environment they are being used in. In certain situations, the use of locks may not be possible (machinery must be kept energized to perform required work). In these cases the Project Manager and Field Safety Officer must be directly involved when tagout is taking place.
Remove locks and tags	Removing locks and/or tags prematurely may lead to electrocution.	Do not allow anyone other than the individual who placed a lock/tag in-place to remove it. If the individual who placed the lock/tag is not immediately available to remove it, work must be suspended until he/she becomes available. If the individual who placed the lock/tag has left the jobsite, use the contact information located in the health and safety plan to attempt to contact them. If they are unable to be contacted, their lock/tag may only be removed through a joint decision from the PM, FSO, and Subcontractor supervisor.

North America Job Hazard Analysis
Energized Equipment and Lockout-Tagout

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 22	

Task Step	Hazard	Control Measures
Lockout Tagout Process Inspection on Sites Longer than 1 Year	Changes to electrically-energized equipment may cause lockout-tagout procedures to become obsolete.	For all sites where work extends beyond 1 year, a lockout-tagout process inspection must occur. The inspection will verify, for each piece of electrically-energized equipment normally worked on, that lockout-tagout procedures in-place are still valid. These process inspections must be documented.

Personal Protective Equipment Required for this Task:

Type	Description
None	

Training Required for this Task:

Type	Description
Lockout-Tagout	Lockout-tagout training describes the process of de-energizing electrical equipment prior to performing work or maintenance on the equipment, and the safeguards that must be used to ensure electrical hazards to employees are controlled.

Forms Associated with this Task:

Type	Description
None	

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Fall Protection

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 23	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Any work at heights exceeding 6 feet.

Hazard Analysis:

Task Step	Hazard	Control Measures
Offsite Preparation	Not having fall protection when needed on a project site. Untrained employees may not understand how or when to use fall protection.	When developing the health and safety plan, include specific fall protection equipment needs known at the time to ensure it is available for use at the site. Using fall protection requires that employees have received formal training. Staff projects requiring fall protection with employees who have attended fall protection training.
Work at heights exceeding 6 feet from any lower level	Significant injury could occur if employees are not wearing fall protection in these instances or other protective devices are not installed.	For work greater than 6 feet higher than a lower level (could be the ground or other situation with multiple levels) ensure employees are wearing appropriate fall protection. Provide protection to employees below by putting protection from falling objects in place (described below). Provide means of quickly rescuing any person wearing fall protection on projects or ensure the employee can self-rescue.

North America Job Hazard Analysis
Fall Protection

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 23	

Personal Protective Equipment Required for this Task:

Type	Description
Fall Protection	Fall protection can take on many forms depending on the task(s) involved, including vertical/horizontal lifeline systems, full body harnesses, shock absorbing lanyards, nets, retractable devices, and others. Check with the North America Safety Team for guidance when fall protection is required on your project. All fall protection must meet applicable ANSI, ASTM, or OSHA requirements.
Protection from Falling Objects	Protection from falling objects can take on many forms, including toeboards/screens/guardrail systems, canopy structures, or work practices preventing people from entering areas where objects may fall from heights.

Training Required for this Task:

Type	Description
Fall Protection Training	Training on the use, care, and maintenance of fall protection equipment.
Fall Protection Retraining	Must be done after incident involving fall protection, when using new fall protection equipment, or when wearing fall protection on a new jobsite.

Forms Associated with this Task:

Type	Description
None	

Site-Specific Job Hazard Analysis Completed by:

Name	Date

North America Job Hazard Analysis
Portable Ladder Use

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 24	

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary.
Project Manager	Retain copy in the office health & safety file, amend to HASP as necessary.

Instructions:	**This JHA has been developed and approved by the North America Safety Team. Prior to conducting fieldwork. site-specific hazards related to this task must be incorporated by the project team. Once completed, the JHA should be reviewed regularly with site personnel who will be performing this task.**

Task Description:

Guidelines for working with portable ladders.

Hazard Analysis:

Task Step	Hazard	Control Measures
Select ladder for use	Selection of a ladder with oil/grease on its surface or a defective/poorly-maintained ladder may lead to not having a suitable ladder at the jobsite. Conductive ladders used around energized equipment could cause electrocution.	Inspect ladders before taking them to jobsites to ensure they are clean, sturdy, and appear well-maintained. Any ladder found to be unusable must be tagged and taken out of service. For work around energized electrical equipment, choose a non-conductive ladder or one with non-conductive side rails.
Loading/Unloading ladder	Muscle strain or other injury may occur from improper lifting of ladders.	Before lifting ladders onto or off of a transport vehicle, pause and determine if the lift is safe to do alone. If not, get help from other individuals.
Placing ladder	Ladders may not be in good working order. Ladders placed on uneven ground or slippery locations may cause ladder failure. Overhead electrical lines may cause electrocution.	Always inspect ladders each time before they are used. Do not use a ladder that appears to be poorly maintained. Place ladders on stable and level surfaces. If not possible, secure the ladder to prevent accidental movement. Use slip-resistant ladder feet in slippery locations. These do not take the place of proper placement or holding a ladder in-place. Ensure no contact between ladders and overhead lines.

North America Job Hazard Analysis
Portable Ladder Use

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 24	

Task Step	Hazard	Control Measures
Going up/down ladder	Employee may lose balance and fall when going up or down a ladder.	Whenever employees are on ladders they should be facing the ladder, including going up and down. Keep hands free and grasp the ladder with one hand at all times. Do not carry loads in your hands on ladders.
Working from ladder	Various hazards could cause employees to lose balance and fall.	Only one person may be on a ladder at any one time. Keep both feet on the ladder rungs – do not place one foot off the ladder onto other equipment. If you must stand backwards on the ladder, and anytime an unstable situation exists, fall protection must be provided and used by employees. In these situations barricade or rope-off the area being worked in to avoid potentially hurting others. Follow any label directions about standing on the top steps of ladders to perform work. If no label exists, do not stand on the top two rungs of the ladder to perform work. Secure all tools and supplies to ensure they do not fall and hurt others. Do not perform extended reaches during work. If at least one foot cannot stay in contact with ladder rungs, dismount the ladder and move to a more convenient location.

Personal Protective Equipment Required for this Task:

Type	Description
None	

Training Required for this Task:

Type	Description
None	

North America Job Hazard Analysis
Portable Ladder Use

Project Name:	Johnson & Hoffman
Project Number:	0142061
Job / Task Name:	Site Wide Remedial Action Work Plan (RAWP)
JHA No.: 24	

Forms Associated with this Task:

Type	Description
Ladder Inspection Checklist	A checklist that may be used to document inspections of portable ladders

Site-Specific Job Hazard Analysis Completed by:

Name	Date

Attachment 2

Subsurface Clearance Field Process Checklist & Subsurface Clearance Location Disturbance Permit

Subsurface Clearance Field Process Checklist

Site/Project Name: _____

Client: _____

ERM Project No.: _____

SSC Exp. Person: _____

Project Information Utilized for Field SSC Activities	Yes	No	N/A	Comments
Contact Person requested and identified				
Subcontractors prequalified and approved				
ERM / client SSC requirements have been communicated to all field personnel (including subcontractors)				
As-built drawings, site plans, aerial photographs, and/or other information sources available and reviewed				
Site Plan(s) / Drawing(s) developed showing subsurface lines/structures, Critical Zones, and planned Ground Disturbance Locations				
SSC Experienced Person with current SSC training assigned				
Project staff with current SSC training assigned				
UXO / MEC risks assessed: UXO / MEC is present or potentially present				If Yes, stop work and contact PIC

General Field Activity & Site Walk	Yes	No	N/A	Comments
HASP available, reviewed, and signed by project team				
Site walk Visual Clues / site features (below) integrated into Site Services Model				

Identified Visual Clue	Yes	No		Identified Visual Clue	Yes	No
Lights				Pipeline markers		
Signage				Fire hydrants		
Sewer drains / cleanouts				Sprinkler systems		
Cable markers				Water meters		
Utility poles with conduit leading to the ground				Natural gas meters		
Utility boxes				UST fill ports and vent pipes		
Manholes				Equipment locations		
Pavement scarring				Steam lines		
Distressed vegetation or vegetation in linear pattern				Remote buildings with no visible utilities		

Comments / Others:

Contact Person Approval of Ground Disturbance at All Locations (indicate verbal approval by printing "Verbal" in the signature space)

Name (Print)	Company	Name (Sign)	Date / Time

Utility Markouts	Yes	No	N/A	Comments
Public Utility Markouts completed (where available; waiver required if "NO")				
List utilities notified:				
Responses received from ALL companies notified?				
Private Utility Markout completed (waiver required if "NO")				
Performed by:				
Type of equipment/methods used:				
Note any limitations (e.g., sources of interference, geology, etc.):				
Final Critical Zone determinations made by the SSC EP				

Subsurface Clearance Field Process Checklist

Site/Project Name: _____

Client: _____

ERM Project No.: _____

SSC Exp. Person: _____

Critical Zones		
Are there any ground disturbance locations <u>known</u> or <u>suspected</u> to be inside Critical Zones?	☐	**Yes.** PIC and BU MP (or designee) must BOTH grant waiver for work within the Critical Zone. The SSC Location Disturbance Permit or equivalent is required for those locations.
	☐	**No.** Physical Clearance will proceed to the deeper of: 0.6 m / 2 feet below the frost line or 1.5 m / 5 feet below ground level, whichever is deeper.

Overhead Clearance	Yes	No	N/A	Comments
Overhead utility lines in the general vicinity of ERM work onsite?				
If overhead utilities are present, has nominal voltage been determined? If yes, list in comments section.				Voltage:
Overhead clearances confirmed with equipment operators for safely deploying equipment to the location? (The minimum horizontal distance from any point on the equipment to the nearest overhead electrical power line should adhere to the minimum clearance requirements stipulated by regulation, utility companies, client requirements, and/or industry best practice.)				Clearance distance(s):
Proximity alarms and /or spotters necessary to ensure safe clearances?				
If the equipment is closer than the minimum clearance distance to the overhead utility, can utility be de-energized via formal lockout/tagout (LOTO) program?				
If utility cannot be de-energized, alternate plan developed with approval from the PIC and client/site owner?				

Clearance for Point Disturbances	Yes	No	N/A	Comments
Physical Clearance technique used (waiver required if no Physical clearance performed)				Specify:
Diameter of physical clearance at least 125% larger than outside diameter of largest downhole tool (150% is best practice)				
Physical Clearance successfully completed at all locations				

Clearance for Excavations	Yes	No	N/A	Comments
Communicate excavation plan and Excavation Buffer location(s) to subcontractor. Delineate excavation buffers.				
There are disturbance locations known or suspected to be inside Critical Zones				
De-energize subsurface services via formal LOTO program prior to beginning excavation				

Additional Notes:

SSC Process Completed By (SSC Experienced Person)		
Name (Print)	Name (Sign)	Date / Time

Subsurface Clearance Location Disturbance Permit

Disturbance Location Designation:

ERM Project No.: _____

SSC Exp. Person: _____

Contact Person Approval of Ground Disturbance Locations (indicate verbal approval by printing "Verbal" in the signature space)

Name (Print)	Company	Name (Sign)	Date / Time

Critical Zone Determination and Clearance Depth (It is not preferred to initiate Ground Disturbance Activities within a Critical Zone)

If the Disturbance Location is known or suspected to fall within a Critical Zone, then a sketch (see reverse) or other map **must be** used to confirm proximal Critical Zones. Sketch / map must be to scale.

This Location Is:

☐ Inside a Critical Zone. Partner-in-Charge (PIC) and Business Unit Managing Partner (BU MP) must BOTH grant waiver for disturbance at this location. Ensure documentation in the SSC Project Plan addendum to the HASP. Physical Clearance will proceed to the deeper of: **0.6 m / 2 feet below the frost line, 0.6 m / 2 feet deeper than the expected invert elevation of the service, OR 2.4 m / 8 feet below ground level.**

☐ Outside a Critical Zone.
Physical Clearance will proceed to the deeper of: **0.6 m / 2 feet below the frost line or 1.5 m / 5 feet below ground level.**

Physical Clearance Technique at This Location

☐ Cleared using the following techniques / equipment:

Clearance depth and diameter (specify units):

☐ None – or not completed to required depth or diameter. Waived by PIC and BU MP.
(Ensure documentation in the SSC Project Plan addendum to HASP.)

Reason: Date / Time:

Physical Clearance Executed & Observed By:

Company	Representative(s)	Date / Time Complete	Notes

Was any Subsurface Structure discovered (damaged or undamaged) during Clearance?

☐ No (Proceed) ☐ Yes If Yes: Work stopped and discussed with PIC (Date / Time): _____

Agreed Action: _____

SSC Process Complete

Name of SSC Experienced Person (Print)	Name (Sign)	Date / Time

Critical Zone Determination Sketch (use this or other map to confirm proximal Critical Zones).

Instructions:

1. Create a sketch of the disturbance (in the space to left or attach) that is drawn to scale and contains the following information:
   a. The disturbance location
   b. Surface landmarks and overhead obstructions (buildings, roads, overhead lines, etc.)
   c. Critical landmarks and Subsurface Structures (tanks, transformers, wells, racks, etc.)
   d. Underground services:
      i. Identified in the Site Service Model
      ii. Marked by Public and Private utility markouts
      iii. As relayed by the Contact Person
      iv. Nearest shutoff / isolation mechanism for each
   e. Any surface clues as to potential underground services (junction boxes, drains, disturbed concrete, signage, etc.)
   f. The site property boundary
2. Use your sketch to mark Critical Zones (3m or 10 feet) around critical landmarks and underground structures / services.
3. For Excavations, use your sketch to mark Excavation Buffers (0.6m or 2 feet) from Subsurface Structures.
4. If the disturbance location falls inside the Critical Zone, the preferred course of action is step out to a safe location outside a Critical Zone.
5. Disturbance within a Critical Zone can only proceed with both PIC and BU MP (or designee) approval.

Attachment 3

Community Air Monitoring Plan

New York State Department of Health
Generic Community Air Monitoring Plan

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical-specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for volatile organic compounds (VOCs) and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate NYSDEC/NYSDOH staff.

Continuous monitoring will be required for all <u>ground intrusive</u> activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well baling/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a **continuous** basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

All 15-minute readings must be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored **continuously** at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

All readings must be recorded and be available for State (DEC and DOH) personnel to review.

June 20, 2000

P:\Bureau\Common\CommunityAirMonitoringPlan (CAMP)\GCAMPR1.DOC

Attachment 4

Daily Safety Meeting Form

Daily Safety Meeting Documentation Form

Project Name: Project Number: Meeting Date & Time: Meeting Leader:

Document Routing	
FSO	Retain copy in site health & safety file.

What work will be conducted on site today and by whom?

Work Task	Conducted By

What overlapping operations/simultaneous operations will occur today?

Any follow-up from previous Major Incidents, Near Misses, Unsafe Acts or Unsafe Conditions discussed today?

List any new / short-service personnel on site today?

Safety Meeting Core Topics – All Site Workers *and* Visitors

- ☐ What PPE is required in order to enter the work zone?
- ☐ What are the potential hazards associated with today's work. How will they be managed?
- ☐ What are the potential impacts of planned activities to: Visitors? Nearby workers? Public?
- ☐ Is everyone aware that they are empowered to stop work if something is questionable or unsafe?
- ☐ What happens and who do you contact if there is an injury or emergency? If working at an active facility, how will you be alerted of an emergency and what will you do?
- ☐ Who do you contact if you have questions, or before deviating from written procedures?
- ☐ Where is fire extinguisher, first aid kit, eyewash, safety shower located?
- ☐ Are any work permits required? Are permits completed and posted in plain view of workers?
- ☐ Have all excavation / borehole locations been cleared of underground utilities/structures, in accordance with ERM and client-specific subsurface clearance procedures?
- ☐ Have all tools / equipment / vehicles been inspected today to ensure safe operating condition?
- ☐ Will a follow-up safety meeting be conducted after lunch?
- ☐ Has anything unexpected or out-of-the-ordinary occurred on this job recently to share?
- ☐ What is the worst that could happen if something goes wrong today?

Daily Safety Meeting Documentation Form

Project Name: Project Number: Meeting Date & Time: Meeting Leader:

Safety Topics Related to ERM 2011/2012 Incident Trends – All Site Workers *and* Visitors

- ☐ What activities occurring today could result in hand injuries? Is everyone aware that the use of fixed open-blade knives is not permitted without cut-resistant gloves?
- ☐ Does the site pose natural hazards to be avoided? Thorny underbrush/ticks/poison ivy?
- ☐ What areas of the site have slip/trip/fall hazards? Are everyone's work boots in good shape?
- ☐ How will the on-site team avoid vehicle accidents? Is everyone aware that taking their eyes off the road for more than 2 seconds (for any reason) leads to vehicle accidents?

Who attended the safety meeting today (employees, subcontractors, visitors)?

Name	Company	Signature	Sign-In Initials*	Sign-Out Initials**

* Initials in this space verify that the employee is fit for performing work.
**Initials in this space verify that the employee was uninjured during the workday.

Who visited the site today but was not involved in work activities?

Name	Company	Arrival Time

Attachment 5

Project Sign-in Sheet

Name	Signature	Company	Date

Attachment 6
Hospital Route Map & Directions

Site Location: 40 Voice Road, Carle Place, NY 11514

Nearest Hospital Name: Winthrop University Hospital

Hospital Location: 259 First Street, Mineola, NY 11501

Hospital Telephone: (516) 663-0333

Directions to the Hospital:

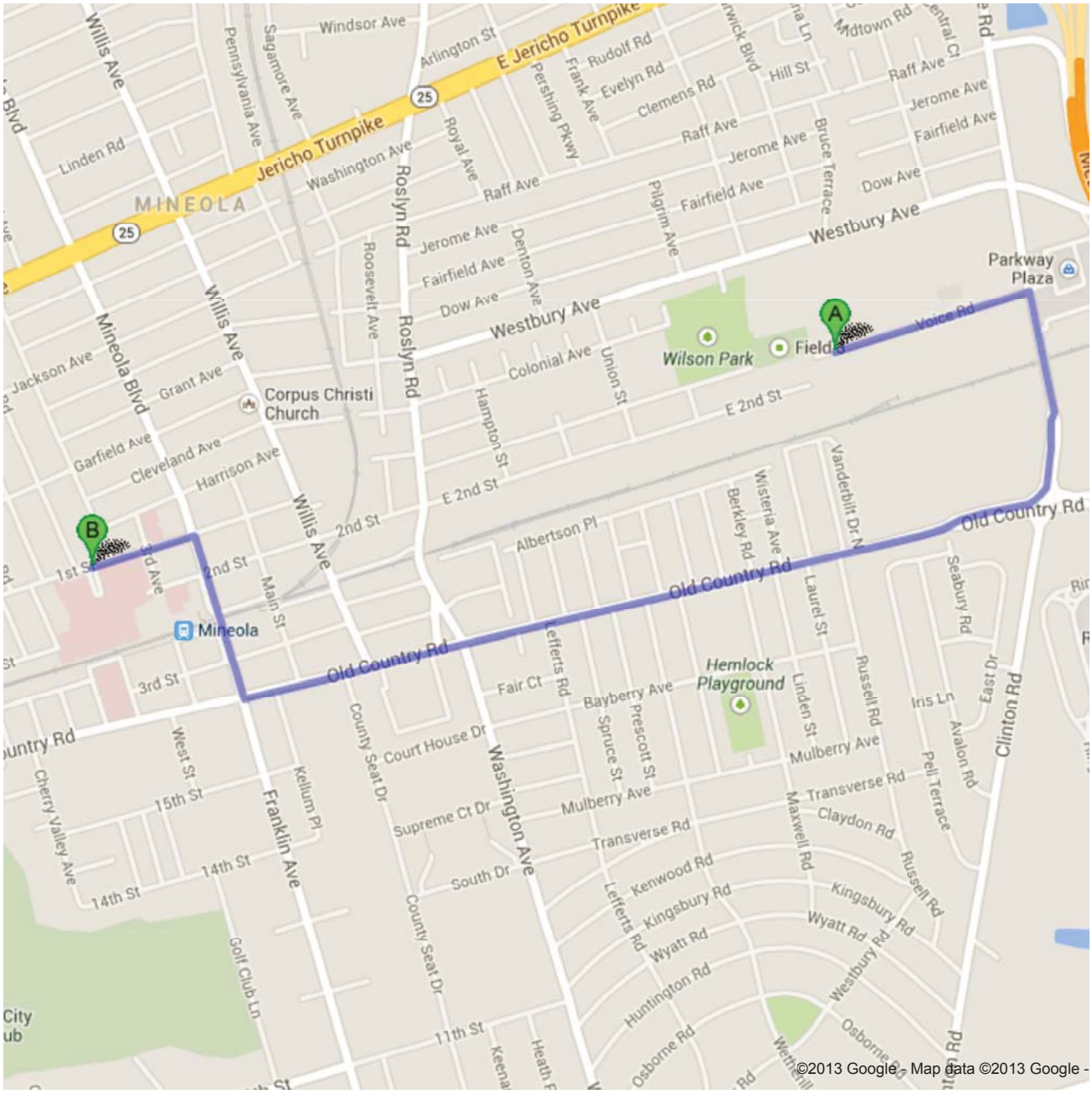
1. Head east on Voice Road toward Glen Cove Road for 0.3 mile
2. Take the first right on Glen Cove Road and proceed 0.3 mile.
3. Turn right onto Old Country Road and proceed 1.2 mile.
4. Turn right onto Mineola Boulevard and proceed 0.2 mile.
5. Take the third left onto First Street and proceed 0.2 mile.
6. Winthrop University Hospital is on the left.

Total Distance: 2.1 miles

Total Estimated Time: 6 minutes

See next page for map showing route from the site to the hospital:

Directions to Winthrop University Hospital
259 1st St, Mineola, NY 11501
2.2 mi – about **6 mins**



Attachment 7
Emergency Drill Evaluation Form

Project Name: Project Number:

Document Routing	
FSO	Retain copy in site health & safety file.

1. Basic Information

Date of the Drill: _____

Drill Facilitator: _____

Name *Signature*

2. Describe the Drill Scenario below

3. Post-drill Review

Evaluation Date: _____

a. List the Positive Attributes of the Drill below

b. List the Opportunities for Improvement below

c. List the corrective actions taken and their completion date below

Corrective Action	Assigned to…	Completion Date

Attachment 8
Site Inspection Checklist

Project Name: Project Number: Inspector/Project Role: Date/Time:

Document Routing	
FSO	Retain copy in site health & safety file, amend to HASP as necessary, and send a copy to your Regional Safety Advisor.

Instructions: Complete the applicable sections of the checklist below.

Personnel/Administrative

Observation	Yes	No	N/A	Comments
Is the HASP approved by the PIC and PM?				
Have all site workers signed the HASP?				
Are workers attending and signing daily toolbox safety meeting?				
Do employees know where the HASP is located?				
Are workers reporting unsafe acts and conditions?				
Does the HASP reflect jobs and tasks being performed at the site?				
Have all subcontractors received initial safety orientation to the site prior to beginning their work?				
Have all visitors received initial safety orientation to the site and signed the HASP?				
Are additional procedures other than the HASP required/present at the site? (examples could include lead exposure control plan, traffic plan, O&M plan for remediation systems, etc.)				

Site

Observation	Yes	No	N/A	Comments
Are MSDS'S available for each chemical at the site?				
Are flammable liquids stored away from ignition sources and in a secure place when not in use?				
Are compressed gas cylinders stored and secured properly with protective caps in place?				
Are spill kits readily available?				

Attachment 8
Site Inspection Checklist

Project Name: Project Number: Inspector/Project Role: Date/Time:

Are fire extinguishers strategically located?				
Are adequate hygiene facilities available for site workers?				
Have smoking and eating areas been established?				
Are site-specific JHAs completed and reviewed by workers?				
Do workers comply with site speed limits and traffic rules?				
Do workers comply with the cell phone policy when operating vehicles?				
Are work zones at the site properly delineated and of sufficient size?				
If work is occurring near an active road, have measures been put into place to protect against traffic?				
Have obstacles (such as holes or excavations) been guarded and signs posted warning of their presence?				
Is the work site appropriately lit?				

Housekeeping

Observation	Yes	No	N/A	Comments
Is site kept clean, neat and orderly?				
Are worker hygiene facilities, maintained and adequately stocked?				
Are warning signs in-place and legible?				
Is trash picked up regularly and properly disposed?				
Is used PPE properly disposed?				
Are containers properly labeled?				
Is there accumulated snow or ice over footpaths or roadways?				

Attachment 8
Site Inspection Checklist

Project Name: Project Number: Inspector/Project Role: Date/Time:

Have trip hazards been identified and removed or controlled?				
Are storage areas for materials orderly and maintained to avoid hazards from falling, rolling, or tripping?				
Are minimum distances maintained for flammable storage areas at the site?				

Emergency Preparedness

Observation	Yes	No	N/A	Comments
Are workers aware of the site emergency response procedures?				
Do workers know the nearest assembly point for their work area?				
Do workers know the location of the nearest eyewash/shower?				
Do workers know the location of the nearest first-aid kit				
Is there at least one first aid trained person on site at all times?				
Do workers know how to report an emergency?				
Do workers know the type of alarm used to identify an emergency or evacuation at the site?				
Has a site emergency evacuation drill been conducted?				

Work Zones

Observation	Yes	No	N/A	Comments
Are exclusion, decontamination and safe zones clearly identified and maintained?				
Are workers following proper decontamination procedures for both personnel and equipment decontamination?				
Is the decontamination station adequately stocked?				
Is the "Buddy System" adhered to?				

Attachment 8
Site Inspection Checklist

Project Name: Project Number: Inspector/Project Role: Date/Time:

Ambient Work Conditions

Observation	Yes	No	N/A	Comments
Is sufficient lighting available to safely do the work?				
If the temperature is above 85 F (29 C), are there liquids available such as Gatorade / water?				
Is there proper ventilation at the site?				
Is air monitoring data available for ambient (background) levels of chemicals at the site?				

Personal Protective Equipment (PPE)

Observation	Yes	No	N/A	Comments
Are employees aware of PPE requirements for the tasks they are performing?				
Are hardhats being worn as specified in the HASP?				
Are workers utilizing appropriate eye protection for the task, as specified in the HASP?				
Are workers utilizing the appropriate foot protection for the task, as specified in the HASP?				
Is hearing protection required and utilized?				
Are workers using and wearing the appropriate gloves/hand protection for the task, as specified in the HASP?				
Is PPE at the site maintained properly and in good condition?				

Respiratory Protection

Observation	Yes	No	N/A	Comments
Are copies of employee respiratory training records, fit tests and fit to work statements current and available on site?				
If a cartridge change-out schedule is required for the site, are workers				

Project Name: Project Number: Inspector/Project Role: Date/Time:

aware of and following it?				
Are workers performing positive and negative fit-checks when donning respirators?				
Are respirators cleaned and stored properly when not in use?				
Have exposure limits been identified for and implemented at the site?				
Are real-time air monitors kept in good condition and calibrated?				
Do employees know what to do when an exposure limit is reached?				
For sites with corrosive materials present, is an eyewash/safety shower available?				

Hand and Powered Hand Tools

Observation	Yes	No	N/A	Comments
Are all hand tools in good working order and appropriate for the task?				
Are electrical cords in good repair and inspected prior to use?				
Are external GFCI'S used and routinely inspected?				
Are guards and other safety devices present and in good working order?				
Are pneumatic hoses in good condition?				
Are fire extinguishers located nearby portable compressors or generators?				
Are generators or compressors shut down prior to fueling?				
Are ladders and/or scaffolds in good condition, properly used, and adequate for the work?				
Are malfunctioning tools tagged and taken out of service?				

Attachment 8
Site Inspection Checklist

Project Name: Project Number: Inspector/Project Role: Date/Time:

Heavy Equipment

Observation	Yes	No	N/A	Comments
Are daily equipment inspection checklists completed?				
Are safety deficiencies immediately repaired or has the equipment been taken out of service?				
Do the back-up alarms work?				
Does the operator use three-points of contact when getting on/off equipment?				
Is heavy equipment operated within its design capacity?				
Is equipment operated at safe speeds for site conditions?				
Are fire extinguishers present and in good working order on all equipment?				
Are keys or control panels removed when equipment is not in use?				
Are workers working with or near heavy equipment operations wearing high visibility clothing (i.e. traffic vest?				

Subsurface Clearance

Observation	Yes	No	N/A	Comments
Has a SSC Experienced Person been designated for the site?				
Have underground utility plans been obtained?				
Have drilling locations been scanned by CAT?				
Has hand-digging been performed as necessary in critical zones?				
Have overhead risks (power lines) been addressed?				

Attachment 8
Site Inspection Checklist

Project Name:
Project Number:
Inspector/Project Role:
Date/Time:

FOLLOW UP ITEMS:

If a checklist item was corrected in the field, please denote this in the body of the audit form in the comments section.

If a checklist item was unable to be corrected in the field, please list below the follow-up items for ERM/Client/Sub-Contractor to implement to correct the deficiency or improve the process. Be sure to assign responsibility and a due date for each item listed below.

Once completed, store a copy with your project file and send a copy to your Regional Safety Advisor.

Follow Up Items:

Attach additional comments, as necessary, to a new page.

Prepared By: _____
(print)

Reviewed By: _____
(print)

_____
(print)

Attachment 8
Site Inspection Checklist

Project Name: Project Number: Inspector/Project Role: Date/Time:

Personnel Interview Question Suggestions

Legislation	
Describe the 3 key pieces of legislation driving local ERM H&S management processes	
Give examples of how this legislation places requirements on the way we manage risk and carry out our work at ERM.	
Responsibilities and accountability	
In the event of a serious incident on a project who hold the key roles within ERM?	
How has the Partner in Charge been involved with this project?	
Communication	
Where do you go to find H&S information?	
Policies and Procedures	
What is the HASP process and what are the key requirements?	
Name 3 ERM H&S related policies/procedures in-place on this project.	
How are safety events recorded and reported at ERM?	
What process do we use to assess and manage travel related risks and what external information sources are available to you to understand risks associated with travel?	
Procedural	
Rate the performance of the PIC generally on the projects reviewed in terms of H&S	
How do rate ERM *BU*'s overall commitment to ensuring the Health and Safety of employees	
Give 2 examples of ERM's H&S systems which you think are particularly effective in protecting our staff.	

Attachment 8
Site Inspection Checklist

Project Name: Project Number: Inspector/Project Role: Date/Time:

Give 2 examples of improvements to ERM's H&S systems which you think would assist in improving performance.	
Project Audit	
Has a preliminary assessment of risks been undertaken and documented?	
Has risk assessment / HASP been reviewed, discussed and signed off by **both** PIC and PM?	
Demonstrate that H&S risks and planning have been communicated to members of the project team.	
EITHER - demonstrate that change in the project has been considered resulting in updated H&S plan ***OR*** give an example of how this might occur on *THIS* project.	
Has there been a project review including H&S? Were any lessons learned? Were any ECS events reported for this project?	
Reminders: • HASPS – level of detail, accurate information, hazard identification, management of change, signatures / review process • Emergency procedures & response – first aid, fire / evacuation • Health / welfare – facilities provided • Subcontractors / subconsultants – contract, ms/ra review, feedback • Service clearance – permits completed, management of change • Scope of work / amendments – sign off, review, who, briefing notes / communication	

TABLE A-1
SUMMARY OF CHEMICAL HAZARDS FOR CHEMICALS OF CONCERN
J&H MANUFACTURING SITE, CARLE PLACE, NEW YORK

Chemical	**Published Exposure Limit [1] (8-hour TWA [2])**	**Routes of Exposure**	**Target Organs**	**Signs/Symptoms of Exposure (Acute versus Chronic Effects)**	**First Aid &Emergency Response**
Chemical Name: **Tetrachloroethylene** CAS: 127-18-4 Vapor Pressure: 14 mm-Hg Ionization Potential: 9.32 eV	100 ppm (OSHA PEL) Carcinogen	Inhalation Skin absorption Ingestion Skin or eye contact	Eyes, skin, respiratory system, liver, kidneys, and central nervous system.	Acute: Irritation eyes, skin, nose, throat, respiratory system, nausea, dizziness Chronic: cancer, liver damage	Flush skin/eyes with water Administer artificial respiration if no breathing If ingested seek medical attention
Chemical Name: **Trichloroethene** CAS: 79-01-6 Vapor Pressure: 58 mm-Hg Ionization Potential: 9.45 eV	100 ppm (OSHA PEL) Carcinogen	Inhalation Skin absorption Ingestion Skin or eye contact	Eyes, skin, respiratory system, heart, liver, kidneys, and central nervous system.	Acute: Irritation eyes, skin, nose, throat, headache, visual disturbance, weakness, exhaustion, nausea, dizziness, vomiting Chronic: cancer, liver damage	Flush skin/eyes with water Administer artificial respiration if no breathing If ingested seek medical attention

TABLE A-1
SUMMARY OF CHEMICAL HAZARDS FOR CHEMICALS OF CONCERN
J&H MANUFACTURING SITE, CARLE PLACE, NEW YORK

Chemical	**Published Exposure Limit [1] (8-hour TWA [2])**	**Routes of Exposure**	**Target Organs**	**Signs/Symptoms of Exposure (Acute versus Chronic Effects)**	**First Aid &Emergency Response**
Chemical Name: **cis-1,2-dichloroethene** CAS: 540-59-0 Vapor Pressure: 180-265 mm-Hg Ionization Potential: 9.65 eV	200 ppm (OSHA PEL)	Inhalation Skin absorption Ingestion Skin or eye contact	Eyes, respiratory system, and central nervous system.	Acute: Irritation eyes, skin, nose, throat, CNS depression,	Flush skin/eyes with water Administer artificial respiration if no breathing If ingested seek medical attention
Chemical Name: **PAHs (aka coal tar pitch)** CAS: NA Vapor Pressure: Compound dependent Ionization Potential: Compound dependent	0.1 mg/m3 (NIOSH REL) 0.2 mg/m3 (OSHA PEL)	Inhalation Skin absorption Ingestion Skin or eye contact	Respiratory system, kidneys, skin, bladder.	Acute: dermatitis, bronchitis	Eye: Irrigate Skin: Soap wash promptly Administer artificial respiration if no breathing If ingested seek medical attention immediately

TABLE A-1
SUMMARY OF CHEMICAL HAZARDS FOR CHEMICALS OF CONCERN
J&H MANUFACTURING SITE, CARLE PLACE, NEW YORK

Chemical	**Published Exposure Limit [1] (8-hour TWA [2])**	**Routes of Exposure**	**Target Organs**	**Signs/Symptoms of Exposure (Acute versus Chronic Effects)**	**First Aid &Emergency Response**
Chemical Name: **Lead** CAS: 7439-92-1 Vapor Pressure: NA Ionization Potential: NA	0.050 mg/m3 (NIOSH REL) 0.050 mg/m3 (OSHA PEL)	Inhalation Ingestion Skin or eye contact	Eyes, gastrointestinal tract, central nervous system, blood, kidneys, gingival tissue	Acute: Lassitude, facial palor, anorexia, weight loss, malnutrition, abdominal pain, colic, anemia, paralysis of wrists/ankles.	Eye: Irrigate Skin: Soap wash promptly Administer artificial respiration if no breathing If ingested seek medical attention immediately

NOTES:

1. The most conservative published occupational exposure limit is listed. Sources for occupational exposure limits were OSHA and ACGIH.
2. OSHA PEL = Occupational Safety and Health Administration Permissible Exposure Limit
3. PPM = parts contaminant per million parts air (by volume)
4. All PAHs are categorized by OSHA under “Coal Tar Pitch”, all with the same PEL

Sources of information include published exposure limits in 29 CFR 1910.1000 or the 2002 TLV Booklet published by ACGIH, NIOSH pocket guide, Chemical/Physical Properties from Texas Risk Reduction Program, International Chemical Safety Cards, MSDSs, and the HNU listing of Photoionization Characteristics of Selected Compounds.

TABLE A-2
ADDITIONAL CHEMICAL HAZARD DATA FOR NON-VOLATILE COCs (METALS, PAHs)
J&H MANUFACTURING SITE, CARLE PLACE, NEW YORK

Chemical	**Maximum Concentration in Site Soil/Sediment (mg/kg)**	**OSHA PEL or NIOSH REL (mg/m^3)**	**Airborne Chemical Concentration in 5.0 mg/m^3 of dust (mg/m^3)**
Mercury	0.89	0.01	4.45E-06
Lead	255	0.05	1.28E-03
Benzo(a)anthracene	5.8	0.1	2.90E-05
Benzo(a)pyrene	8.5	0.1	4.25E-05
Benzo(b)flouranthene	10.8	0.1	5.40E-05
Benzo(k)flouranthene	10.8	0.1	5.40E-05
Chrysene	12.1	0.1	6.05E-05
Dibenz(a,h)anthracene	1.6	0.1	8.00E-06
Fluoranthene	Not Detected	0.1	NA
Indeno(1,2,3-c,d)pyrene	4.5	0.1	2.25E-05
Pyrene	Not Detected	0.1	NA

NOTES:

1. The most conservative published occupational exposure limit is listed. Sources for occupational exposure limits were OSHA and ACGIH.
2. OSHA PEL = Occupational Safety and Health Administration Permissible Exposure Limit
3. All PAHs are categorized by OSHA under “Coal Tar Pitch”, all with the same PEL and REL

Sources of information include published exposure limits in 29 CFR 1910.1000 or the 2002 TLV Booklet published by ACGIH, NIOSH pocket guide, Chemical/Physical Properties from Texas Risk Reduction Program, International Chemical Safety Cards, MSDSs, and the HNU listing of Photoionization Characteristics of Selected Compounds.

TABLE A-3
SUMMARY OF CHEMICAL HAZARDS FOR CHEMICALS ROUTINELY USED BY ERM
J&H MANUFACTURING SITE, CARLE PLACE, NEW YORK

Chemical	**Exposure Limit (1) (8-hr TWA (2))**	**Routes of Exposure**	**Target Organs**	**Signs/Symptoms of Exposure (Acute versus Chronic Effects)**	**First Aid & Emergency Response**
Chemical Name: **Portland Cement** Vapor Pressure: N/A, solid Ionization Potential: N/A, solid	10 mg/m^3 (ACGIH TLV)	Inhalation Skin contact Ingestion	Eyes, skin, respiratory system	Acute Irritation of eyes, skin and respiratory system; skin burns Chronic Contains trace amounts of crystalline silica which cause silicosis and may be carcinogenic	Flush eyes/skin with water Administer artificial respiration if not breathing Seek medical attention immediately if ingested
Chemical Name: **Bentonite** Vapor Pressure: N/A, solid Ionization Potential: N/A, solid	0.05 mg/m^3 (ACGIH TLV for crystalline silica)	Inhalation Skin contact Ingestion	Eyes, skin, respiratory system	Acute Irritation of eyes, skin and respiratory system Chronic Contains trace amounts of crystalline silica which may cause silicosis; potential carcinogenic	Flush eyes/skin with water Administer artificial respiration if not breathing Seek medical attention immediately if ingested
Chemical Name: **Silica sand** Vapor Pressure: N/A, solid Ionization Potential: N/A, solid	0.05 mg/m^3 (ACGIH TLV)	Inhalation Skin contact Ingestion	Eyes, respiratory system	Acute Irritation of eyes; coughing Chronic Silicosis; lung carcinogen	Flush eyes with water Move to fresh air Seek medical attention

TABLE A-3
SUMMARY OF CHEMICAL HAZARDS FOR CHEMICALS ROUTINELY USED BY ERM
J&H MANUFACTURING SITE, CARLE PLACE, NEW YORK

Chemical	**Exposure Limit (1) (8-hr TWA (2))**	**Routes of Exposure**	**Target Organs**	**Signs/Symptoms of Exposure (Acute versus Chronic Effects)**	**First Aid & Emergency Response**
Chemical Name: **Isobutylene Balance Air** CAS: N/A, mixture Vapor Pressure: N/A, gas at ambient conditions Ionization Potential: N/A, mixture	None established	Inhalation	Respiratory system	Acute: Simple asphyxiant, difficulty breathing, cyanosis, rapid pulse, impairment of senses, mental disturbances, and convulsions Chronic: None known	Move to fresh air, administer artificial respiration if not breathing See medical attention

NOTES:

1. The most conservative published occupational exposure limit is listed. Sources for occupational exposure limits were OSHA and ACGIH.
2. TWA = time weighted average
3. mg/m^3 = milligrams of contaminant per cubic meter of air
4. ACGIH TLV = American Conference of Governmental Industrial Hygienists Threshold Limit Value
5. ppm = parts of contaminant per million parts of air
6. OSHA PEL = Occupational Safety and Health Administration Permissible Exposure Limit

Sources of information include published exposure limits in 29 CFR 1910.1000 or the 2002 TLV Booklet published by ACGIH, NIOSH pocket guide, Chemical/Physical Properties from Texas Risk Reduction Program, International Chemical Safety Cards, MSDSs, and the HNU listing of Photoionization Characteristics of Selected Compounds.

TABLE A-4
ACTION LEVELS
J&H MANUFACTURING SITE, CARLE PLACE, NEW YORK

Contaminant	***Action Level (units)****	***Monitoring Instrument***
Dust	5.0 (mg/m^3)	MIE DR 1000 Personal Data RAM Aerosol Monitor
TVOC Concentration (ppm)	5.0 ppm (TWA) in breathing zone	Photovac PID with 11.6 eV lamp or, MiniRae 2000 with 11.6 eV lamp or, Flame ionization detector

* For upgrading from Level D to Level C personal protective equipment (PPE) or stopping work to consider other potential controls.

TABLE A-5
SITE-SPECIFIC AND TASK-SPECIFIC HAZARDS AND CONTROL STRATEGIES
J&H MANUFACTURING SITE, CARLE PLACE, NEW YORK

Task/Activity	***Hazards***	***Control Strategy***
All activities at site Level D PPE	Poisonous plants	• Identify suspect plants • Wash exposed body parts and equipment thoroughly after work in highly-vegetated areas
	Non-stinging insects	• Insect repellant
	Stinging insects	• Survey work area for presence of nests • Eliminate nests
	Thunder/Lightning	• If drilling, cease work following first indication of thunder/lightning • Shelter in buildings or vehicles not underneath trees or near drilling equipment • Begin work after 15 minutes has elapsed from last thunder/lightning
	Cold Stress	• Appropriate clothing • Frequent short breaks in warm dry shelter as needed
	Slip/Trip/Fall	• Awareness of surroundings and footing • Survey areas for snow and ice
Drilling	Heavy equipment movement	• Personnel maintain eye contact with operators when near the rig.
	Dropped equipment, slip, trip or fall.	• Hard hats, steel-toe safety shoes and safety glasses worn during equipment operation.
	Noise	• Hearing protectors with proper noise reduction rating.
Completion, development, and sampling of groundwater well	Splashing of contaminated groundwater	• Safety glasses; chemical-resistant suits (as determined necessary by SSO)

TABLE A-6
PERSONAL PROTECTION EQUIPMENT REQUIREMENTS
J&H MANUFACTURING SITE, CARLE PLACE, NEW YORK

PPE Level	Ensemble Components	Anticipated Use
Level D Should be worn only as a work uniform and not in any area with respiratory or skin hazards. It provides minimal protection against chemical hazards.	• Long pants and shirt with sleeves • Steel-toed footwear • Safety glasses with molded side shields or goggles. • Hard hat if potential for head injury or falling debris is possible/or client requirement • General purpose work gloves if task does not involve water or wet materials • Hearing protection • High visibility traffic vest when in traffic areas	All activities unless otherwise directed by the SSO, PM, and Project Manager and Project Health and Safety Coordinator .
Modified Level D	Level D and the following: • Disposal Tyvek coveralls • Steel-toed rubber boots or disposal boot covers over shoes • Thin nitrile gloves • Green nitrile gloves over thin nitrile gloves when primary gloves may tear or puncture	Any of the above-referenced tasks in which there is moderate potential for skin contact
Level C Should be worn when the criteria for using air-purifying respirators are met, and a lesser level of skin protection is needed.	Level D or Modified Level D and the following: • Half-face air purifying respirator with combination organic vapor/high efficiency particular air (HEPA) cartridges	Any of the above-referenced tasks in which there is moderate potential for skin contact with constituents and data indicating need for respiratory protection. No upgrade to Level C without approval from Project Manager and Project Health and Safety Coordinator
Level B Should be worn when the highest level of respiratory protection is needed, but a lesser level of skin protection is needed.	Not anticipated to be required	Tasks requiring Level B PPE are not anticipated during this project. If Level B PPE is needed, as determined by the SSO and/or the Project Health and Safety Consultant, the HASP will be revised.
Level A Should be worn when the highest level of respiratory, skin, and eye protection is needed.	Not anticipated to be required	Tasks requiring Level A PPE are not anticipated during this project. If Level A PPE is needed, as determined by the SSO and/or the Project Health and Safety Consultant, the HASP will be revised

APPENDIX H
Site Management Forms

Summary of Green Remediation Metrics for Site Management

Site Name: _____ Site Code: _____
Address: _____ City: _____
State: _____ Zip Code: _____ County: _____

Initial Report Period (Start Date of period covered by the Initial Report submittal)
Start Date: _____

Current Reporting Period
Reporting Period From: _____ To: _____

Contact Information
Preparer's Name: _____ Phone No.: _____
Preparer's Affiliation: _____

I. Energy Usage: Quantify the amount of energy used directly on-site and the portion of that derived from renewable energy sources.

	Current Reporting Period	**Total to Date**
Fuel Type 1 (e.g. natural gas (cf))		
Fuel Type 2 (e.g. fuel oil, propane (gals))		
Electricity (kWh)		
Of that Electric usage, provide quantity:		
Derived from renewable sources (e.g. solar, wind)		
Other energy sources (e.g. geothermal, solar thermal (Btu))		

Provide a description of all energy usage reduction programs for the site in the space provided on Page 3.

II. Solid Waste Generation: Quantify the management of solid waste generated on-site.

	Current Reporting Period (tons)	**Total to Date (tons)**
Total waste generated on-site		
OM&M generated waste		
Of that total amount, provide quantity:		
Transported off-site to landfills		
Transported off-site to other disposal facilities		
Transported off-site for recycling/reuse		
Reused on-site		

Provide a description of any implemented waste reduction programs for the site in the space provided on Page 3.

III. Transportation/Shipping: Quantify the distances travelled for delivery of supplies, shipping of laboratory samples, and the removal of waste.

	Current Reporting Period (miles)	**Total to Date (miles)**
Standby Engineer/Contractor		
Laboratory Courier/Delivery Service		
Waste Removal/Hauling		

Provide a description of all mileage reduction programs for the site in the space provided on Page 3. Include specifically any local vendor/services utilized that are within 50 miles of the site.

IV. Water Usage: Quantify the volume of water used on-site from various sources.

	Current Reporting Period (gallons)	**Total to Date (gallons)**
Total quantity of water used on-site		
Of that total amount, provide quantity:		
Public potable water supply usage		
Surface water usage		
On-site groundwater usage		
Collected or diverted storm water usage		

Provide a description of any implemented water consumption reduction programs for the site in the space provided on Page 3.

V. Land Use and Ecosystems: Quantify the amount of land and/or ecosystems disturbed and the area of land and/or ecosystems restored to a pre-development condition (i.e. Green Infrastructure).

	Current Reporting Period (acres)	**Total to Date (acres)**
Land disturbed		
Land restored		

Provide a description of any implemented land restoration/green infrastructure programs for the site in the space provided on Page 3.

Description of green remediation programs reported above (Attach additional sheets if needed)
Energy Usage:
Waste Generation:
Transportation/Shipping:
Water usage:
Land Use and Ecosystems:
Other:

CERTIFICATION BY CONTRACTOR
I, _____ (**Name**) do hereby certify that I am _____ (**Title**) of the Company/Corporation herein referenced and contractor for the work described in the foregoing application for payment. According to my knowledge and belief, all items and amounts shown on the face of this application for payment are correct, all work has been performed and/or materials supplied, the foregoing is a true and correct statement of the contract account up to and including that last day of the period covered by this application. _____ **Date** **Contractor**

APPENDIX I
O&M Manual for SSDS

APPENDIX I
SUB-SLAB DEPRESSURIZATION SYSTEM OPERATION AND MAINTENANCE MANUAL

Johnson & Hoffman Manufacturing Site
Carle Place, New York
NYSDEC Site No. V-00684

February 2018

Prepared for:
Manley Holdings, Inc.
CAWSL Enterprises, Inc.
Ansaco Properties One LLC

Prepared by:
Environmental Resources Management
105 Maxess Road, Suite 316
Melville, New York 11747

TABLE OF CONTENTS

TABLES

APPENDICES

1.0 INTRODUCTION

This Operation and Maintenance Plan describes the measures necessary to operate, monitor and maintain the mechanical components of the remedy selected for the Site. This Operation and Maintenance Manual:

- Includes the steps necessary to allow individuals unfamiliar with the Site to operate and maintain the SSDS;
- Includes an operation and maintenance contingency plan; and,
- Will be updated periodically to reflect changes in Site conditions or the manner in which the SSD are operated and maintained.

A copy of this Operation and Maintenance Manual, along with the complete SMP, will be kept at the Site. This Operation and Maintenance Manual is not to be used as a stand-alone document, but as a component document of the SMP.

1.2 ENGINEERING CONTROL SYSTEM OPERATION AND MAINTENANCE

1.2.1 Sub-slab Depressurization System

1.2.1.1 Scope

This section of the SMP describes the ongoing O&M activities for the SSD system. A QEP employed by the owner currently performs O&M activities outlined here (hereafter referred to as the "operator" of the SSD system). The principal objectives of the O&M activities of the Site are to operate, maintain, and monitor the SSD system for the Site. The goal for operation of the SSD system is to maintain a sub-slab vacuum of at least 0.001 inches water column (w.c.) (during all building and weather conditions) across the majority of the building footprint.

The system consists of a soil vapor extraction positive displacement blower from a single well. The extracted soil vapor is vented directly to the atmosphere per NYSDEC approval.

All system components must be operated at specific values to and regularly maintained to provide the necessary engineering controls that are part of the final remedy. Specific requirements are provided in the following sections.

The SSD system consists of a positive displacement blower, silencers, and pressure release valves. A list of system equipment by manufacturer is provided in Table 1-1. Specific details about each component are as follows:

Blower: The SVE system uses an EG&G Rotron DR 8 regenerative blower. At design, the blower should operate at a total flow of 200 cfm from the site extraction well. The original system employed multiple extraction points joined at a manifold at the system trailer. The infrastructure for this arrangement remains if future conditions warrant a system change. The flow from each well is modified at the manifold valves. The blower is powered by a 10 HP motor.

Knockout Tank: This component is not used with the current arrangement. Information provided is for prior operations if future conditions indicate the equipment is needed. Prior to the SSDS blower, extracted air passes through a 55 gallon drum to remove excess moisture. The knockout tank is equipped with a float switch that will turn off the system in the event too much water accumulates in the tank.

Silencers and Filters: In order to reduce noise produced by the SSD system, a dilution intake filter and silencer AF300 manufactured by EG&G Rotron are installed between components.

Carbon vessels: The system does not require carbon treatment prior to discharge as per NYSDEC approval. The system previously utilized carbon in 400 pound vessels for vapor phase treatment.

Meters and Switches: Various meters for pressure, temperature, and flow are present coupled with system processes. System temperature switches are manufactured by Mercoid. Total SVE flow is measured through a WE Anderson Vane Operated Flow Switch. Differential pressure switch is an H3 Series manufactured by WE Anderson.

Autodialer: The system is equipped with a Model 400 call out system by Sensaphone with Bluetooth interface. The complete system will shut down when triggered alarms from the high or low pressure switches on the SSDS blower.

1.2.1.2 System Start-Up and Testing

The system was originally started up on March 8, 2006. Following initial discharge system testing and a radius of influence test the system began normal operation on March 15, 2006.

The following is a step-by-step procedure, which will help ensure the system begins its operation successfully. This startup guide is assembled to help ensure common mistakes are prevented and to provide knowledge to our customers. This document cannot be expected to cover all possible startup conditions. Follow all standard safety procedures when following these instructions.

- Confirm that all power switches are in the off position.
- Confirm electrical power is being supplied from the adjacent LIPA utility pole to the system.
- Verify each motor overload setting matches each motor's full load amperage as indicated on the motor's nameplate.
- Check piping connections both external and internal. Look for evidence of leaks or broken seals.
- Check for ice if freezing conditions are present, to minimize flow restrictions.
- Open dilution bypass valve to not overload blower during startup. Do not open for sample ports and relief valves.
- If the shutdown is a result of re-wiring the system, or adding a new component, all motors should be bumped to confirm proper flow direction.
- Confirm presence and proper position of all pressure and temperature switches in the system using the P&ID drawings.
- Adjust switches to auto to activate system.
- Adjust other valves and switches to balance system into design operating values as described in the next section.
- Check startup system parameters.

Catalog cuts for all of the system components can be found in this Appendix.

The system was adjusted to a single point SSDS in 2011 and communication testing was performed to determine the effectiveness of the modified sub-slab depressurization system. ERM conducted a radius of influence of negative pressure (vacuum) test beneath the building foundation slab within the area requiring mitigation. The desired negative pressure for each measuring point, as recommended by the NYSDOH, is minimum 0.001 inches w.c. when the building exhaust system is running.

Vacuum influence measurements were taken from one vacuum extraction well, five permanent sub-slab soil vapor sampling ports, and two air

ventilation points on 8 March 2016. Table 1-2 below provides the measurements taken from each of the monitoring points.

Table 1-2 – Vacuum Influence

ID	Pressure ("WC)*
VEW-5	-37
JH-SS-01	0
JH-SS-02	-.005
JH-SS-03	-.007
JH-SS-04	-0.032
JH-SS-05	-0.162
AV-1	-0.255
AV-2	-0.376

*A negative pressure designates a vacuum.

These results demonstrate that a consistent sub-slab vacuum was obtained in the majority of the building.

The SSDS is currently in use, and has already undergone system start-up testing, and balancing. The system testing described below will be conducted if, in the course of the SSD system lifetime, significant changes are made to the system, and the system must be restarted:

1. Following start-up of the SSDS after a system modification, a representative sub-slab vapor sample will be collected from the SSDS effluent point (i.e., the blower exhaust) for a total of one sample. In Figure 5-3 of the SMP, the sample point is represented as SP308. The testing will be performed utilizing SUMMA® canisters and analyzing the samples for the VOCs via the USEPA TO-I5 method. The results from the TO-15 analyses of the air from the effluent stack will be used to confirm that emissions controls are not required prior to discharge. Calculations will be performed using the NYSDEC Division of Air Resources 1 (DAR-1) Ambient Air Quality Impact Screening Analysis. This model will use concentrations of all VOCs measured during testing, and the discharge flow rates to calculate annual and short-term impacts, which will be compared to the DAR-1 Annual

Guideline Concentrations, and Short-Term Guideline Concentrations, respectively.

2. Shortly after start-up of the SSDS, the sub-slab pressure at each monitoring point will be measured utilizing an appropriate hand-held manometer. If necessary, the applied vacuum at the suction points will be adjusted to achieve a minimum of 0.004 inches w.c. vacuum across the majority of the building. The objective will be to obtain similar vacuum measurements to those shown in Table 1-2 above. The valves near each suction point will be utilized to balance the sub-slab pressure.
3. After achieving the maximum vacuum coverage as possible, smoke tests will be performed in the vicinity of SSD system modifications to identify any leaks through cracks in the building floor, floor joints, and suction points. Identified leaks will be resealed until smoke tests indicate that an appropriate seal of the floor slab has been achieved.
4. Any building operations equipment relying upon natural draft for exhaust of carbon monoxide and other combustion gases will be tested for back draft caused by the operation of the SSD system. Back draft poses a potential health concern because of carbon monoxide. Testing for back draft will entail utilizing a carbon monoxide meter to detect the presence of this compound in the air near exhausts for appliances. If necessary, any back draft caused by the SSD system will be corrected by sealing any leaks in the floor slab, as indicated above.

The system testing described above will be conducted if, in the course of the SSDS lifetime, the system goes down or significant changes are made to the system and the system must be restarted.

1.2.1.3 System Operation: Routine Operation Procedures

At a minimum, the system should be checked according to the schedule in Section 1-3. The design parameters for the system operation in the following section shall not be adjusted unless confirmed values are also acceptable according to manufacturer's recommendations as described in this Appendix.

SSDS Blower: Maintain a flow of 200 cfm from the single extraction well. Exhaust from the blower must not exceed 140 F to not impact the system piping. The maximum differential pressure across the unit shall not exceed 15 psi (415" H2O) and the maximum inlet vacuum of 15" HG (205" H2O). Check the run-time meter.

Carbon Vessels: Soil gas emitted from the SSD system shall comply with the substantive NYSDEC air discharge requirements. **The following only**

applies if carbon is required in the future. Carbon will need to be changed out once breakthrough has occurred, and will be indicated by the carbon sample vapor PCE concentration having within 85% of the precarbon PCE concentration. While this may be indirectly indicated with a PID, analytical data should be used to determine that a changeout is needed. After a change out, former lead and lag units will then switch place, with the fresh carbon in the lag unit. If at any time the discharge vapor on both the lead and lag unit exceeds 8 PPM, the system shall be shut down until a complete carbon changeout can be completed on both units.

Silencers and Filters: Manufacturer recommends to not exceed a pressure differential of more than 15" H20 across filter unit.

Overall System Integrity: Conduct a visual inspection of the complete system. Inspect the floor slab and foundation walls for any evidence of cracks and/or holes, and repair of cracks and/or holes, if required. Inspect the integrity and repair the pipes, if required.

1.2.1.4 System Operation: Routine Equipment Maintenance

The list of routine maintenance per type of equipment on a monthly basis is provided below:

Blower: Checks for hot spots, changes in vibration and noise, and pressure temperatures should also be conducted monthly. More information and can be found in the operations manual in this Appendix.

Knockout Tank: If used in the future, there are no monthly maintenance requirements. Levels in the drum should be checked monthly, and water removed.

Silencers and Filters: There are no monthly maintenance requirements. An annual checking and replacement of the filter media is recommended, as indicated by system performance. See catalog cut sheets in this Appendix for further maintenance information.

Carbon vessels: If used in the future, there is no monthly maintenance required. Confirm vapor reading and pressure differentials during inspections as described in previous sections.

Meters and Switches: There are no monthly maintenance requirements. See catalog cut sheets in this Appendix for further maintenance information.

Autodialer: There are no monthly maintenance requirements. See catalog cut sheets in this Appendix for further maintenance information.

Additionally, the system is to be shut down annually to maintain the integrity of the electrical termination connections in the control panel. Over time, the wiring connections may be loosened by the inherent low-frequency vibrations of the SSD.

Table 1-3 Monitoring Frequency

Remedial System Component	Monitoring Parameter	Operating Range	Monitoring Schedule
SSDS Influent	PID	0-1000 ppm	Quarterly
SSDS Blower	Flow Rate	0 – 250 CFM	Quarterly
Control Panel	Runtime	Total Hours	Quarterly
Gauges	Temperature	0-180 deg F	Quarterly
Gauges	Vacuum Pressure	0 to (-) 100 in" H20	Quarterly
Knock Out Drum	Inches of water	0-32 inches	Quarterly
General system piping	Visual	Acceptable/Not Acceptable	Quarterly
Vacuum Influence Points	Vacuum Pressure	≥ .004 inches H20	Quarterly
Control Panel	Termination Connections	Acceptable/Not Acceptable	Annually

Record all system parameters as described in the Table 1-3 quarterly.

1.2.1.5 *System Operation: Non-Routine Equipment Maintenance*

Periodic adjustments to the system will be required to ensure maintenance of adequate air/soil gas flow through the SSD system. Adjustments to the valves of the SSD well(s) are required when insufficient or excessive vacuum has been detected. The valves located on each of the manifold legs can be opened or closed to increase or decrease airflow and vacuum. The dilution gate valve can also be utilized to increase or decrease system vacuum. Actual site conditions are likely to vary as soil moisture content fluctuates. As soil moisture content increases, you are likely to see higher running vacuums and quicker elapsed time to fill the moisture separator if utilized. The system has been designed to withstand such fluctuations. If

there is too much water entering the system, simply reduce the vacuum by closing the ball valves on the manifold, or opening the dilution valve. If for any reason there is a system shutdown that requires an unscheduled visit, and it appears it is necessary to replace a piece of equipment or instrumentation, refer to the manuals provided in the appendices for replacement parts, model numbers, etc.

1.2.1.6 SSDS Deactivation

If the owner or responsible party believes system deactivation should be considered or would like to alter the operating parameters of the SSD system (e.g. operate the SSDS beneath a reduced section of the building), a work plan shall be submitted to the NYSDEC and the NYSDOH detailing the proposed testing to be undertaken. Following NYSDEC/NYSDOH approval of the testing plan, the owner or responsible party will implement the plan and forward the results to the NYSDEC/NYSDOH for their evaluation. The system may only be deactivated with NYSDEC and NYSDOH approval. Note: The NYSDEC must be notified prior to any major repair of the SSDS that would require it be taken off-line for a period longer than 48 hours. Furthermore, the repair or decommissioning process will be documented in the subsequent PRR.

1.3 ENGINEERING CONTROL SYSTEM PERFORMANCE MONITORING

An SSDS was installed as an IRM to dually mitigate possible vapor intrusion at the on-site property in addition to a reduction in the on-site contaminant mass. The current SSD consists of a single soil vapor extraction point and air ventilation points, and direct atmospheric discharge. The system started operation on March 8, 2006. The As-Builts for the AS/SVE system can be found in the SMP.

Regular monitoring and sampling is required in order to verify the proper functioning of the system as designed and is described within this section.

An active SSDS has been designed and installed to prevent VOCs in soil gas from entering the building. The principal components of the SSDS consist of:

- a concrete floor slab system;
- vapor extraction points beneath the floor slab;
- a blower system (blower, filter, temperature and pressure gauges);
- exhaust piping from the SSD blower to the ambient air;
- a valve for control of the air flow at the extraction point;

- sub-slab vacuum monitoring points located throughout the floor slab; and,
- sampling/monitoring points at selected locations throughout piping system.

The SSD monitoring schedule is described below in Table 1-4

A summary of the associated inspection frequencies is as follows:

Table 1-4: Schedule of Inspections for SSDS

Task	Reporting Frequency*	Performed by:
Start-up Testing	Whenever significant changes are made to the system, and the system must be restarted	QEP
Perform inspections as outlined in Section 1.2.1.3	Monthly/Annually As specified	Operator
Routine Equipment Maintenance	As specified in Service & Parts Manual (Appendix A)	QEP
SSD exhaust sampling	Quarterly	QEP
Non-Routine Equipment Maintenance	As needed	QEP

Inspection frequency is subject to change with the approval of the NYSDEC. Unscheduled inspections and/or sampling may take place when a suspected failure of the SSDS has been reported or an emergency occurs that is deemed likely to affect the operation of the system. Monitoring deliverables for the SSDS are specified later in this Plan.

1.3.2 General Equipment Monitoring

Sub-Slab Depressurization System

A visual inspection of the complete system will be conducted during the monitoring event. SSDS components to be monitored include, but are not limited to, the following:

- Vacuum blower, vacuum, flow, and temperature;
- General System Piping;
- Individual SSDS well head pressure vacuums; and,
- Effluent concentrations exiting blower or carbon vessels as utilized.

A complete list of components to be checked is provided in Table 1-5 and listed in the Inspection Checklist, presented in this Appendix. If any equipment readings are not within their typical range, any equipment is observed to be malfunctioning, or the system is not performing within specifications, maintenance and repair as per the Operation and Maintenance Plan are required immediately, and the AS/SVE system restarted.

1.3.3 System Monitoring Devices and Alarms

The SSDS has alarms for SVE vacuum blower failure; and system monitoring devices, see table 1- 5 for Alarm conditions.

Call out unit: Sensaphone CELL 682

In the event that the warning device is activated, applicable maintenance and repairs will be conducted, as specified in the Operation and Maintenance Plan, and the SSDS system restarted. Operational problems will be noted in the subsequent Periodic Review Report.

1.3.4 Sampling Event Protocol

All samples collected will be shipped via overnight delivery to an Environmental Laboratory Accreditation Program (ELAP)-certified laboratory. Soil vapor samples will be analyzed for Site-specific VOCs (see QAPP in SMP) using USEPA Method TO-15, with a target detection limit of 1.0 microgram per cubic meter (µg/m3) for all parameters.

All laboratory data will be provided in ASP Category B deliverable format, the data validated and a Data Usability Summary Report provided. Results will be reported in the first PRR after sampling, and will include: 1) a summary of the sampling activities performed including any required deviations from this SMP, 2) a summary table of all sampling results, 3) sampling logs, 4) photographs of sampling locations, 5) discussion of data validation reports, 6) discussion of Category B laboratory data deliverables, 7) calculations for DAR-1 Ambient Air Quality Impact Screening Analysis (if applicable), and 8) conclusions regarding the need for emission controls (if applicable). All data will be submitted to the NYSDEC in the appropriate Electronic Data Deliverable format.

Samples of the SSDS exhaust will be taken if, in the course of the SSDS lifetime, significant changes are made to the system, and the system must be restarted. Effluent samples will be taken. Grab samples of untreated

SSDS exhaust air will be collected with a batch-certified clean Summa® canister.

Pertinent data will be recorded in the field notebook and/or data collection forms. This information will include the following items:

- sampler's name;
- date, time and PID reading;
- date and time of sample start and stop;
- Summa® canister serial number;
- initial and final Summa® canister vacuum;
- sample identification, and descriptive location of the sampling area;
- weather conditions including ambient temperature inside and outside the building;
- SSDS operating conditions;
- apparent moisture content of the air being sampled; and,
- description of features that may impact the vapor measurements (e.g., storage areas for materials that may contain VOCs, drainage facilities, utility lines, any contamination noted, stains, etc.); and all equipment calibrations performed.

1.4 MAINTENANCE AND PERFORMANCE MONITORING REPORTING REQUIREMENTS

Maintenance reports and any other information generated during regular operations at the Site will be kept on-file on-Site. All reports, forms, and other relevant information generated will be available upon request to the NYSDEC and submitted as part of the Periodic Review Report.

1.4.1 Routine Maintenance Reports

Checklists or forms (see Appendix I of Site Management Plan) will be completed during each routine maintenance event for the SSDS and SETS. Checklists/forms will include, but not be limited to the following information:

- Date;
- Name, company, and position of person(s) conducting maintenance activities;
- Maintenance activities conducted;

- Any modifications to the system;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents noted (included either on the checklist/form or on an attached sheet); and,
- Other documentation such as copies of invoices for maintenance work, receipts for replacement equipment, etc., (attached to the checklist/form).

1.4.2 Non-Routine Maintenance Reports

During each non-routine maintenance event, a form will be completed which will include, but not be limited to, the following information:

- Date;
- Name, company, and position of person(s) conducting non-routine maintenance/repair activities;
- Reason for non-routine maintenance;
- Presence of leaks;
- Date of leak repair;
- Other repairs or adjustments made to the system;
- Where appropriate, color photographs or sketches showing the approximate location of any problems or incidents (included either on the form or on an attached sheet); and,
- Other documentation such as copies of invoices for repair work, receipts for replacement equipment, etc. (attached to the checklist/form).

2.0 TROUBLESHOOTING GUIDE

Note: This section is to be periodically updated.

Last Update: December 2017

As with most mechanical systems, the best means of trouble-shooting specific equipment is referring to the manufacturer's manuals for specific trouble-shooting guidelines. For this ISMP, these manuals are presented in this Appendix.

However, procedures for some more typical problems with SSD systems are described below. This guide should be reviewed and updated annually with common problems and solutions for this specific system.

2.1 NO POWER OR SYSTEM IS OFF UPON ARRIVAL

- If power is off upon arrival and there are no alarms, check the main disconnect at the power drop, and at the system enclosure, to make sure no one has turned the power off.
- If the disconnects are on, check to make sure it isn't a failure of the indicating lights. Turn each blower in 'Hand' using the HOA switch. If they run, there may be an alarm, but the light is out. Check the knock-out tank to see if there is water present. If there is, follow the procedures outlined above for draining the knock-out. Any other trouble-shooting may involve working inside the panels with the system ' hot.' This should only be performed by competent personnel familiar with these trouble-shooting procedures, and will not be discussed in this section.

2.2 VACUUM RELIEF VALVE KEEPS RELEASING

- Check all the valves on the influent and effluent of each blower to make sure they have not been inadvertently closed. If they have opened them to the proper position.
- If the valves are open, check the vacuum or pressure gauges to see if they are within normal ranges. If they are, then there may be something wrong with the relief valve. Try adjusting the valve to see if the valve reseats. If not, shut the system down, and follow the procedures outlined in the manual presented in this Appendix.

2.3 BLOWER IS RUNNING NORMALLY, BUT A FLOW METER(S) OR GAUGE(S) IS NOT RESPONDING.

- First, check all the other gauges to see if they are responding normally. The same goes with the flow meter. If they are, then you may just have a gauge or indicator that needs to be replaced.
- If none of the gauges are responding, or flow meters, but the blowers are running (a very unlikely scenario), the dilution valve may be opened too far, or you may have a breach in the piping. Check the dilution valve by opening/closing it, and see if there is any gauge/indicator response. If that does not work, inspect all the piping while the blowers are running to determine if you can find the break/leak. Once located, shut the system down and make the necessary repairs.

2.4 THE SYSTEM IS RUNNING BUT THE FLOW RATES AND VACUUM RATES ARE DOWN, BUT SYSTEM PRESSURE AND TEMPERATURE IS UP.

- Check the air filter on the blower(s), first by checking the vacuum gauges on the inlet and outlet. If the differential vacuum is higher than normal, or exceeds 15-in w.c., shut the blower(s) down. Open the housing for the filter element, and remove and replace the internal element. Start the system backup, and see if the differential goes down, and the system vacuum rates and flow rates return to normal.

TABLE 1-1
SSD EQUIPMENT LIST
JOHNSON & HOFFMAN SITE
CARLE PLACE, NEW YORK

#	Item	Quantity	Tag Nos.	Manufacturer/Model	Description
1	SSD Blower	1	B300	EG&G DR8	Regenerative Blower
2	Flow Element	2	FE301, FE302	Dwyer DS-300-3	Annubar Type
3	Differential Pressure Gauge	2	DPG301, DPG302	Dwyer Magnehelic	
4	Flow Control Valve	2	FCV301, FCV302		3-inch butterfly valve
5	Temperature Gauge	2	TG301, TG302	Trend	
6	Isolation Valve	1	IV301		3-inch butterfly valve
7	Dilution Valve	1	DV300		3-inch butterfly valve
8	Isolation Valve	1	IV302		1-inch ball valve
9	Liquid Level Switch	1	LSH300	W.E. Anderson FloTect L6	
10	Vacuum Relief Valve	1	VRV300	Rotron 515092	27-inch to 124 inch w.c.
11	Flow Switch	1	FSL300	W.E. Anderson FloTect	Vane Operated
12	In-line Filter	1	AF300	Rotron 516435	
13	Differential Pressure Switch	1	DPSH300	W.E. Anderson H3S1S	
14	Temperature Switch	1	TSH300	United Electric	
15	Vent Valve	1	VV300		2-inch butterfly valve
16	SSD Control Panel	1			
17	Sensaphone Alarm Callout	1		Sensaphone	Model 400
18	Vacuum/Pressure Ports	4	VGP303 TO VGP305, PGP300		1/8-inch barb
19	Sample Ports	6	SP301 TO SP306		1/8-inch barb

TABLE 1-5
SSD CONTROL SYSTEM FEATURES
JOHNSON & HOFFMAN SITE
CARLE PLACE, NEW YORK

Control	*Triggering Mechanism*	*Setpoint*	*Action*
Low Flow Switch (on time delay) (FSL300)	Low SSD system influent flow	70 scfm	Shut down SSD blower Autodialer alarm
High Differential Pressure Switch (DPSH300)	High differential pressure across SVE blower	100 inches w.c.	Shut down SVE blower Autodialer alarm
Vacuum Relief Valve (VRV300)	Elevated vacuum on blower inlet	80 inches w.c.	Draw in ambient air
High Temperature Switch (TSH300)	Elevated temperature at blower outlet	180oF	Shut down SSD blower Autodialer alarm

-->

contact@ansacollc.com

SENSAPHONE
Monitoring Accessory

General Accessories

Bluetooth Cell Phone Interface

Description

The XLink allows your Sensaphone to dial and receive calls using any cell phone with Bluetooth technology. For example, suppose land-line telephone service was unavailable at the Sensaphone's location. By using the XLink you can provide telephone service to your Sensaphone by locating a cell phone next to the device. The XLink will send all incoming calls to the Sensaphone and when the Sensaphone needs to dial out the call will be seamlessly completed through the cell phone. The XLink is a wireless (Bluetooth) link between your Sensaphone and a cellular phone. This can be a cost-effective option considering that many cellular providers offer inexpensive options to add another phone. Perfect for access where a land line simply isn't available, the XLink is a must.

Package Contents

(1) Bluetooth Cell Phone Interface

(1) Power Supply

(1) 3' Telephone Wire

(1) Operating Instructions

Specifications

Bluetooth:
Bluetooth® v2.0
Hands–free profile
Frequency 2.4GHz

Operating Temperature:
32° to 104°F (0° to 40°C)

Physical Size:
4.5" x 1.8" x 4.4"

Compatibility:
400, 800, 1400, 1800, 2800, and Express II

*Specifications subject to change without notice

Bluetooth Cell Phone Interface FGD-0230

SENSAPHONE®

Model 400

User's Manual

Version 1.3

Every effort has been made to ensure that the information in this document is complete, accurate and up-to-date. PHONETICS, Inc. assumes no responsibility for the results of errors beyond its control. PHONETICS, Inc. also cannot guarantee that changes in equipment made by other manufacturers, and referred to in this manual, will not affect the applicability of the information in this manual.

First Edition, version 1.3, April, 2010

Written and produced by Sensaphone.

Please address all comments on this publication to:

SENSAPHONE

901 Tryens Road

Aston, PA 19014

www.sensaphone.com

IMPORTANT SAFETY INSTRUCTIONS

Your Model 400 has been carefully designed to give you years of safe, reliable performance. As with all electrical equipment, however, there are a few basic precautions you should take to avoid hurting yourself or damaging the unit:

- Read the installation and operating instructions in this manual carefully. Be sure to save it for future reference.
- Read and follow all warning and instruction labels on the product itself.
- To protect the Model 400 from overheating, make sure all openings on the unit are not blocked. Do not place on or near a heat source, such as a radiator or heat register.
- Do not use your Model 400 near water, or spill liquid of any kind into it.
- Be certain that your power source matches the rating listed on the AC power transformer. If you're not sure of the type of power supply to your facility, consult your dealer or local power company.
- Do not allow anything to rest on the power cord. Do not locate this product where the cord will be abused by persons walking on it.
- Do not overload wall outlets and extension cords, as this can result in the risk of fire or electric shock.
- Never push objects of any kind into this product through ventilation holes as they may touch dangerous voltage points or short out parts that could result in a risk of fire or electric shock.
- To reduce the risk of electric shock, do not disassemble this product, but return it to Sensaphone Customer Service, or other approved repair facility, when any service or repair work is required. Opening or removing covers may expose you to dangerous voltages or other risks. Incorrect reassembly can cause electric shock when the unit is subsequently used.
- If anything happens that indicates that your Model 400 is not working properly or has been damaged, unplug it immediately and follow the procedures in Appendix F for having it serviced. Return the unit for servicing under the following conditions:

1. The power cord or plug is frayed or damaged.
2. Liquid has been spilled into the product or it has been exposed to water.
3. The unit has been dropped, or the cabinet is damaged.
4. The unit doesn't function normally when you're following the operating instructions.

- Avoid using a telephone (other than a cordless type) during an electrical storm. There may be a remote risk of electric shock from lightning.
- Do not use the telephone to report a gas leak in the vicinity of the leak.

CAUTION

To Reduce the Risk of Fire or Injury to Persons, Read and Follow these Instructions:

1. Use only the following type and size batteries:
   Alkaline, size C.
2. Do not dispose of the batteries in a fire. The cell may explode. Check with local codes for possible special disposal instructions.
3. Do not open or mutilate the batteries. Released electrolyte is corrosive and may cause damage to the eyes or skin. It may be toxic if swallowed.
4. Exercise care in handling batteries in order not to short the battery with conducting materials such as rings, bracelets, and keys. The battery or conductor may overheat and cause burns.
5. Do not mix old and new batteries in this product.

FCC Requirements

Part 68: The Sensaphone® Model 400 complies with Part 68 of the FCC rules. On the back of the unit there is a label that contains, among other information, the FCC Registration Number and the Ringer Equivalence Number (REN) for this equipment. You must, upon request, provide this information to your local telephone company.

The REN is useful to determine the quantity of devices that you may connect to your telephone line and still have all of those devices ring when your telephone number is called. In most, but not all areas, the sum of the RENs of all devices connected to one line should not exceed five (5.0). To be certain of the number of devices that you may connect to your line, you may want to contact your local telephone company to determine the maximum REN for your calling area.

This equipment may not be used on coin service provided by the telephone company. Connection to party lines is subject to state tariffs.

Should the Model 400 cause harm to the telephone network, the telephone company may discontinue your service temporarily. If possible, they will notify you in advance. But if advance notice isn't practical, the telephone company may temporarily discontinue service without notice and you will be notified as soon as possible. You will be informed of your right to file a complaint with the FCC. The telephone company may make changes in its facilities, equipment, operations, or procedures where

such action is reasonably required in the operation of its business and is not inconsistent with the rules and regulations of the FCC that could affect the proper functioning of your equipment. If they do, you will be notified in advance to give you an opportunity to maintain uninterrupted telephone service.

If you experience trouble with this equipment, or you need information on obtaining service or repairs, please contact:

PHONETICS, INC.

901 Tryens Road, Aston, PA 19014

610-558-2700 Fax: 610-558-0222

The telephone company may ask that you disconnect this equipment from the network until the problem has been corrected or until you are sure that the equipment is not malfunctioning.

Part 15: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and the receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/television technician for help.

Canadian Department of Communications Statement

Notice: The Canadian Department of Communications label identifies certified equipment. This certification means that the equipment meets certain telecommunications network protective operational and safety requirements. The Department does not guarantee the equipment will operate to the user's satisfaction.

Before installing this equipment, users should ensure that it is permissible to be connected to the facilities of the local telecommunications company. The equipment must also be installed using an acceptable method of connection. In some cases, where the company's inside wiring is associated with a single line, individual service may be extended by means of a certified connector assembly (telephone extension cord). The customer should be aware that compliance with the above conditions may not prevent degradation of service in some situations.

Repairs to certified equipment should be made by an authorized Canadian maintenance facility designated by the supplier. Any repairs or alterations made by the user to this equipment, or equipment malfunctions, may give the telecommunications company cause to request the user to disconnect the equipment.

Users should ensure for their own protection that the electrical ground connections of the power utility telephone lines and internal metallic water pipe system, if present, are connected together. This precaution may be particularly important in rural areas.

CAUTION: Users should not attempt to make such connections themselves, but should contact the appropriate electric inspection authority, or electrician, as appropriate.

The Load Number (LN) assigned to each terminal device denotes the percentage of the total load to be connected to a telephone loop which is used by the device to prevent overloading. The termination on loop may consist of any combination of devices subject only to the requirement that the total of the Load Numbers of all the devices does not exceed 100. For the Sensaphone® Model 400, the Load Number is 0.3.

1 YEAR LIMITED WARRANTY

PLEASE READ THIS WARRANTY CAREFULLY BEFORE USING THE PRODUCT.

THIS LIMITED WARRANTY CONTAINS SENSAPHONE'S STANDARD TERMS AND CONDITIONS. WHERE PERMITTED BY THE APPLICABLE LAW, BY KEEPING YOUR SENSAPHONE PRODUCT BEYOND THIRTY (30) DAYS AFTER THE DATE OF DELIVERY, YOU FULLY ACCEPT THE TERMS AND CONDITIONS SET FORTH IN THIS LIMITED WARRANTY.

IN ADDITION, WHERE PERMITTED BY THE APPLICABLE LAW, YOUR INSTALLATION AND/OR USE OF THE PRODUCT CONSTITUTES FULL ACCEPTANCE OF THE TERMS AND CONDITIONS OF THIS LIMITED WARRANTY (HEREINAFTER REFERRED TO AS "LIMITED WARRANTY OR WARRANTY"). IF YOU DO NOT AGREE TO THE TERMS AND CONDITIONS THIS WARRANTY, INCLUDING ANY LIMITATIONS OF WARRANTY, INDEMNIFICATION TERMS OR LIMITATION OF LIABILITY, THEN YOU SHOULD NOT USE THE PRODUCT AND SHOULD RETURN IT TO THE SELLER FOR A REFUND OF THE PURCHASE PRICE. THE LAW MAY VARY BY JURISDICTION AS TO THE APPLICABILITY OF YOUR INSTALLATION OR USE ACTUALLY CONSTITUTING ACCEPTANCE OF THE TERMS AND CONDITIONS HEREIN AND AS TO THE APPLICABILITY OF ANY LIMITATION OF WARRANTY, INDEMNIFICATION TERMS OR LIMITATIONS OF LIABILITY.

1. **WARRANTOR**: In this Warranty, Warrantor shall mean "Dealer, Distributor, and/or Manufacturer."

2. **ELEMENTS OF WARRANTY**: This Product is warranted to be free from defects in materials and craftsmanship with only the limitations and exclusions set out below.

3. **WARRANTY AND REMEDY**: One-Year Warranty — In the event that the Product does not conform to this warranty at any time during the time of one year from original purchase, warrantor will repair the defect and return it to you at no charge.

This warranty shall terminate and be of no further effect at the time the product is: (1) damaged by extraneous cause such as fire, water, lightning, etc. or not maintained as reasonable and necessary; or (2) modified; or (3) improperly installed; or (4) misused; or (5) repaired or serviced by someone other than Warrantors' authorized personnel or someone expressly authorized by Warrantor's to make such service or repairs; (6) used in a manner or purpose for which the product was not intended; or (7) sold by original purchaser.

LIMITED WARRANTY, LIMITATION OF DAMAGES AND DISCLAIMER OF LIABILITY FOR DAMAGES: THE WARRANTOR'S OBLIGATION UNDER THIS WARRANTY IS LIMITED TO REPAIR OR REPLACEMENT OF THE PRODUCT, AT THE WARRANTOR'S OPTION AS TO REPAIR OR REPLACEMENT. IN NO EVENT SHALL WARRANTORS BE LIABLE OR

RESPONSIBLE FOR PAYMENT OF ANY INCIDENTAL, CONSEQUENTIAL, SPECIAL AND/OR PUNITIVE DAMAGES OF ANY KIND, INCLUDING BUT NOT LIMITED TO ANY LABOR COSTS, PRODUCT COSTS, LOST REVENUE, BUSINESS INTERRUPTION LOSSES, LOST PROFITS, LOSS OF BUSINESS, LOSS OF DATA OR INFORMATION, OR FINANCIAL LOSS, FOR CLAIMS OF ANY NATURE, INCLUDING BUT NOT LIMITED TO CLAIMS IN CONTRACT, BREACH OF WARRANTY OR TORT, AND WHETHER OR NOT CAUSED BY WARRANTORS' NEGLIGENCE. IN THE EVENT THAT IT IS DETERMINED IN ANY ADJUDICATION THAT THE LIMITED WARRANTIES OF REPAIR OR REPLACEMENT ARE INAPPLICABLE, THEN THE PURCHASER'S SOLE REMEDY SHALL BE PAYMENT TO THE PURCHASER OF THE ORIGINAL COST OF THE PRODUCT, AND IN NO EVENT SHALL WARRANTORS BE LIABLE OR RESPONSIBLE FOR PAYMENT OF ANY INCIDENTAL, CONSEQUENTIAL, SPECIAL AND/OR PUNITIVE DAMAGES OF ANY KIND, INCLUDING BUT NOT LIMITED TO ANY LOST REVENUE, BUSINESS INTERRUPTION LOSSES, LOST PROFITS, LOSS OF BUSINESS, LOSS OF DATA OR INFORMATION, OR FINANCIAL LOSS, FOR CLAIMS OF ANY NATURE, INCLUDING BUT NOT LIMITED TO CLAIMS IN CONTRACT, BREACH OF WARRANTY OR TORT, AND WHETHER OR NOT CAUSED BY WARRANTORS' NEGLIGENCE.

WITHOUT WAIVING ANY PROVISION IN THIS LIMITED WARRANTY, IF A CIRCUMSTANCE ARISES WHERE WARRANTORS ARE FOUND TO BE LIABLE FOR ANY LOSS OR DAMAGE ARISING OUT OF MISTAKES, NEGLIGENCE, OMISSIONS, INTERRUPTIONS, DELAYS, ERRORS OR DEFECTS IN WARRANTORS' PRODUCTS OR SERVICES, SUCH LIABILITY SHALL NOT EXCEED THE TOTAL AMOUNT PAID BY THE CUSTOMER FOR WARRANTORS' PRODUCT AND SERVICES OR $250.00, WHICHEVER IS GREATER. YOU HEREBY RELEASE WARRANTORS FROM ANY AND ALL OBLIGATIONS, LIABILITIES AND CLAIMS IN EXCESS OF THIS LIMITATION.

INDEMNIFICATION AND COVENANT NOT TO SUE: YOU WILL INDEMNIFY, DEFEND AND HOLD HARMLESS WARRANTORS, THEIR OWNERS, DIRECTORS, OFFICERS, EMPLOYEES, AGENTS, SUPPLIERS OR AFFILIATED COMPANIES, AGAINST ANY AND ALL CLAIMS, DEMANDS OR ACTIONS BASED UPON ANY LOSSES, LIABILITIES, DAMAGES OR COSTS, INCLUDING BUT NOT LIMITED TO DAMAGES THAT ARE DIRECT OR INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL, AND INCLUDING ATTORNEYS FEES AND LEGAL COSTS, THAT MAY RESULT FROM THE INSTALLATION, OPERATION, USE OF, OR INABILITY TO USE WARRANTORS' PRODUCTS AND SERVICES, OR FROM THE FAILURE OF THE WARRANTORS' SYSTEM TO REPORT A GIVEN EVENT OR CONDITION, WHETHER OR NOT CAUSED BY WARRANTORS' NEGLIGENCE.

YOU AGREE TO RELEASE, WAIVE, DISCHARGE AND COVENANT NOT TO SUE WARRANTORS, THEIR OWNERS, DIRECTORS, OFFICERS, EMPLOYEES, AGENTS, SUPPLIERS OR AFFILIATED COMPANIES, FOR ANY AND ALL LIABILITIES POTENTIALLY ARISING FROM ANY CLAIM, DEMAND OR ACTION BASED UPON ANY LOSSES, LIABILITIES, DAMAGES

OR COSTS, INCLUDING BUT NOT LIMITED TO DAMAGES THAT ARE DIRECT OR INDIRECT, INCIDENTAL, SPECIAL OR CONSEQUENTIAL, AND INCLUDING ATTORNEYS FEES AND LEGAL COSTS, THAT MAY RESULT FROM THE INSTALLATION, OPERATION, USE OF, OR INABILITY TO USE WARRANTORS' PRODUCTS AND SERVICES, OR FROM THE FAILURE OF THE WARRANTORS' SYSTEM TO REPORT A GIVEN EVENT OR CONDITION, WHETHER OR NOT CAUSED BY WARRANTORS' NEGLIGENCE, EXCEPT AS NECESSARY TO ENFORCE THE EXPRESS TERMS OF THIS LIMITED WARRANTY.

EXCLUSIVE WARRANTY: THE LIMITED WARRANTY OR WARRANTIES DESCRIBED HEREIN CONSTITUTE THE SOLE WARRANTY OR WARRANTIES TO THE PURCHASER. ALL IMPLIED WARRANTIES ARE EXPRESSLY DISCLAIMED, INCLUDING: THE WARRANTY OF MERCHANTABILITY AND THE WARRANTY OF FITNESS FOR A PARTICULAR USE AND THE WARRANTY OF FITNESS FOR A PARTICULAR PURPOSE AND THE WARRANTY OF NON-INFRINGEMENT AND/OR ANY WARRANTY ARISING FROM A COURSE OF DEALING, USAGE, OR TRADE PRACTICE.

It must be clear that the Warrantors are not insuring your premises or business or guaranteeing that there will not be damage to your person or property or business if you use this Product. You should maintain insurance coverage sufficient to provide compensation for any loss, damage, or expense that may arise in connection with the use of products or services, even if caused by Warrantors' negligence. The warrantors assume no liability for installation of the Product and/or interruptions of the service due to strikes, riots, floods, fire, and/or any cause beyond Seller's control, further subject to the limitations expressed in any License Agreement or other Agreement provided by Warrantors to purchaser.

The agreement between the Warrantors and the Purchaser, including but not limited to the terms and conditions herein shall not be governed by the Convention for the International Sale of Goods. Where applicable, the Uniform Commercial Code as adopted by the State of Delaware shall apply.

4. **PROCEDURE FOR OBTAINING PERFORMANCE OF WARRANTY**: In the event that the Product does not conform to this warranty, the Product should be shipped or delivered freight prepaid to a Warrantor with evidence of original purchase.

5. **LEGAL REMEDIES AND DISCLAIMER**: Some jurisdictions may not allow, or may place limits upon, the exclusion and/or limitation of implied warranties, incidental damages and/or consequential damages for some types of goods or products sold to consumers and/or the use of indemnification terms. Thus, the exclusions, indemnification terms and limitations set out above may not apply, or may be limited in their application, to you. If the implied warranties can not be excluded, and the applicable law permits limiting the duration of implied warranties, then the implied warranties herein are to be limited to the same duration as the applicable written warranty or warranties herein. The warranty or warranties

herein may give you specific legal rights that will depend upon the applicable law. You may also have other legal rights depending upon the law in your jurisdiction.

6. **CHOICE OF FORUM AND CHOICE OF LAW**: In the event that a dispute arises out of or in connection with this Limited Warranty, then any claims or suits of any kind concerning such disputes shall only and exclusively be brought in either the Court of Common Pleas of Delaware County, Pennsylvania or the United States District Court for the Eastern District of Pennsylvania.

Regardless of the place of contracting or performance, this Limited Warranty and all questions relating to its validity, interpretation, performance and enforcement shall be governed by and construed in accordance with the laws of the State of Delaware, without regard to the principles of conflicts of law.

Effective date 05/01/2004
PHONETICS, INC. d.b.a. SENSAPHONE
901 Tryens Road
Aston, PA 19014
Phone: 610.558.2700 Fax: 610.558.0222
www.sensaphone.com

TABLE OF CONTENTS

CHAPTER 1: INTRODUCTION

The Sensaphone® Model 400 is a fully-programmable, environmental monitoring system that offers extensive on-site and remote monitoring capability to small businesses, private homes, farms, greenhouses, computer rooms, and remote facilities. Designed for desktop or wall mounting, the Model 400 is simple to install, program and operate; no changes to standard electrical or telephone service are required. When connected to a telephone line, it will respond to an alarm by dialing up to four separate telephone numbers. When the call is answered, an "Alert Condition" message is delivered in user recordable voice.

The Model 400 features built-in sensors to monitor a variety of conditions:

- High sound level
- AC electric power failure
- Battery backup
- Temperature*

  ***Note:** While technically not a "built-in" sensor, temperature is factory installed on zone 1.

The 400 is equipped with 4 alert zones. Additional sensors* can be added to extend monitoring capabilities to include:

- Intrusion or unauthorized entry
- Water leaks and seepage
- Temperature
- Humidity
- Equipment operation
- Many other conditions that may require unique monitoring solutions

* Refer to Appendix D for information on additional sensors (available separately from Sensaphone) best suited to your application.

The status of each monitored condition is readily obtained at the unit's installation site, or remotely by telephone. At the close of every Status Report, time is provided for listening to on-site sounds.

To ensure reliable operation, the Model 400 features power backup capability; in the event of AC power failure, six C-cell alkaline batteries (not included) will continue to power the unit for approximately 24 hours.

FEATURE SUMMARY

The Sensaphone 400 includes the following features:

- Four zones configurable as temperature or dry contact
- Each zone can be individually enabled or disabled
- Fully automatic input configuration
- Temperature sensor included on zone #1
- Calibration for each zone
- Power monitor
- High sound-level monitor
- User-recordable voice messages
- Dial out to four telephone numbers
- Alarm dial out via voice and numeric pager
- Microphone for onsite listen-in
- Built-in line seizure
- Relay output (manual or automatic control)
- Four status LEDs
- Surge protection on all zones, telephone line, and power supply
- 24 hour battery backup (batteries not included)
- Wall or desktop installation

ABOUT THIS MANUAL

This manual comprises the instructions and commands for installing and operating the Model 400. The Quick Start chapter is included to speed understanding of programming and operation. Communication and Alarm Programming chapters demonstrate step-by-step methods for utilizing the full range of available features. The Troubleshooting chapter provides assistance in the event that problems are encountered.

LAYOUT

1. Programming Keypad
2. Power Jack
3. Phone Extension Jack
4. Phone Line Jack
5. Speaker
6. Built in Microphone
7. System on LED
8. Phone-in-use LED
9. Alarm LED
10. Battery OK LED
11. Battery Compartment
12. Input/Output Wiring Door

LED INDICATORS

The LEDs provide on-site alarm and status information. Listed below are descriptions of how the LEDs work.

System On

LED Off: Unit is off

LED On: Unit is in Run mode

LED Blinking: Unit is in Standby mode

Phone-In-Use

LED On: The unit or some other device is communicating on the phone line

LED Off: Phone line is not in use

LED Blinking: No telephone service detected

Alarm

LED Off: No alarms exist

LED Blinking: Unacknowledged alarm exists

LED On: Acknowledged alarm exists

Battery OK

LED On: Battery condition good

LED Blinking: Battery condition low

LED Off: No battery/critically low battery condition

TECHNICAL SUPPORT

If any questions arise upon installation or operation of the Model 400, please contact the Sensaphone Technical Service Department at the number shown below, and have the following information:

- Date of Purchase _____
- Serial number of your Model 400 _____

Technical Support is available from 8:00am to 5:00pm EST.

You may also e-mail us at support@sensaphone.com.

SENSAPHONE
901 Tryens Road
Aston, PA 19014

Phone: 610-558-2700
Fax: 610-558-0222

www.sensaphone.com

CHAPTER 2: INSTALLATION

Correctly installing the Model 400 will ensure proper functioning of the unit. Please read the entire chapter before starting the installation process.

Within the packaging will be a Warranty Registration Card. Please take the time to fill this out and mail. The One Year Limited Warranty is explained in the front of this manual.

2.1 OPERATING ENVIRONMENT

The Model 400 should be installed and operated in a clean, dry area that provides space for wiring sensors to the screw terminals, near an AC power source and telephone line. Operating temperature ranges from 32° Fahrenheit (0° Celsius) to +122° Fahrenheit (+50° Celsius).

> **NOTE:** The Model 400 is a sensitive electronic device. Do not install the Model 400 near strong electrostatic, electromagnetic or radioactive fields. Do not expose to humid environments, fumes, or corrosive vapors.

2.2 MOUNTING

Flat Mount: Place the Model 400 on top of a desk or other horizontal surface. Wall Mount: Mount on a wall with two flathead screws using the keyholes on the back panel of the unit. Place the flathead screws or bolts 4” apart at the desired height from the floor. Hook the unit over the screws and toward the floor. Refer to Figure 2-1.

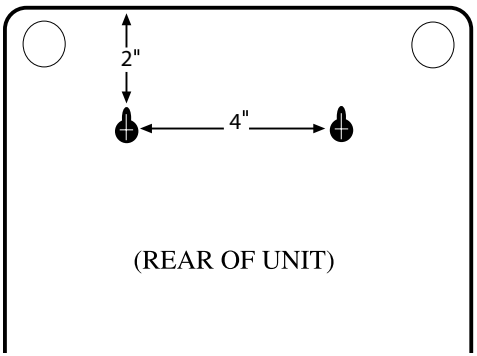


Figure 2-1. Wall Mount

2.3 POWER SURGE PROTECTION

The Model 400 can be damaged by power surges and lightning through the telephone line and the 120 VAC power supply. Although the Model 400 has built-in surge protection, we recommend that additional protection be obtained for the unit and for any electronic equipment that is attached

to your power supply and telephone lines. Power surge protection is especially important if you live in a lightning-prone area. The ISOTEL Surge Protector Model IB-4 is available through Sensaphone. See Appendix D.

2.4 POWER SUPPLY AND BATTERY BACKUP

The Model 400 is provided with a DC power transformer that will plug into any standard 120 VAC outlet and a battery backup (batteries not included) that enables the unit to continue functioning if AC power is removed (due to electric power disruption or failure). The Model 400 uses six, C-cell alkaline batteries. Do not use rechargeable batteries. Connect the DC power transformer into the jack on the back of the unit and plug the adapator into a 120VAC outlet

NOTE: Be sure that the DC transformer is plugged into an outlet before installing batteries.

To install the batteries, remove the battery compartment door located on the front of the unit below the keypad. Press down and slide the door away from the unit, align batteries according to the diagram shown in Figure 2-2, and replace the hatch.

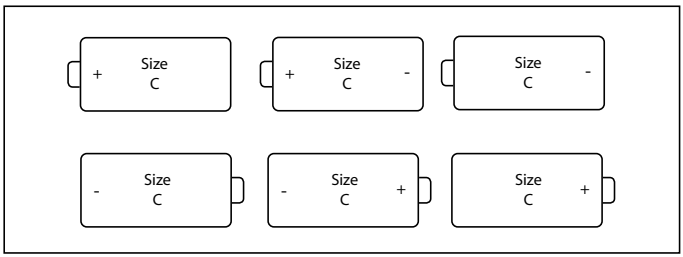


Figure 2-2. Battery Installation

2.5 STARTING THE MODEL 400

When the DC power transformer is first plugged into the electrical outlet, the Model 400 automatically starts in RUN mode. The System On light will begin to glow. The unit will respond with,"Hello, this is Sensaphone 400."

2.6 RUN MODE AND STANDBY MODE

Pressing the RUN/STANDBY key on the Model 400 keypad will alternately activate or deactivate the unit. If the unit is activated and in RUN mode, the system on light glows steadily. In STANDBY mode, the system on light goes out, but will blink every few seconds to indicate that power is still supplied to the unit.

In RUN mode, the Model 400 is able to receive incoming calls and to dial out automatically in the event of an alarm on one of the monitored conditions. To enter STANDBY mode, press RUN/STANDBY.

As soon as the Model 400 enters STANDBY mode, it responds with "Goodbye." The system on light immediately goes out and then resumes with a blink every few seconds. While in STANDBY mode, all functions are disabled, but programmed memory is preserved. Upon exiting STANDBY mode, any currently existing alarms will be announced.

> **NOTE:** STANDBY mode is not equivalent to "power off"—an electrical source, such as the 120 VAC, or the battery backup, continues to provide full power to the unit. If the unit is placed in STANDBY mode, unplugged from the 120 VAC outlet, and placed in storage, the batteries will continue to power the Model 400, discharging until they fail. Consequently, batteries should always be removed from the unit following disconnection from any 120 VAC outlet, prior to storage.

Press the RUN/STANDBY key again to return to RUN mode.

Figure 2-3. The RUN/STANDBY Key

2.7 TELEPHONE LINE

The Model 400 will operate with all standard analog telephone lines that accept pulse or tone dialing. The Model 400 cannot be used on an extension line to dial its own telephone number. Also, it may not be installed on a party line, pay telephone line, or digital telephone system.

Certain private telephone systems and public switching equipment may not accept the Model 400 dialing or may generate an unacceptable ring signal. In those cases, a dedicated line may be required. Consult the supplier of your telephone system if you encounter problems.

If you do not have a modular telephone extension at the Model 400's location, you must contact your local telephone company to have one installed (there is a charge for this service). If you have four-pin jacks, adapters are available to convert them to the modular plugs. Contact your local telephone company or electronics parts store.

> **CAUTION:** Never install telephone wiring during a lightning storm. Never install telephone jacks in wet locations unless the jack is specifically designed for wet locations. Never touch uninsulated telephone wires or terminals unless the telephone line has been disconnected at the network interface. Use caution when installing or modifying telephone lines.

To install the telephone line, plug one end of the modular cord into the "line" jack on the back of the model 400 (as shown) and plug the other end into any standard RJ11 phone outlet.

Refer to Figure 2-4.

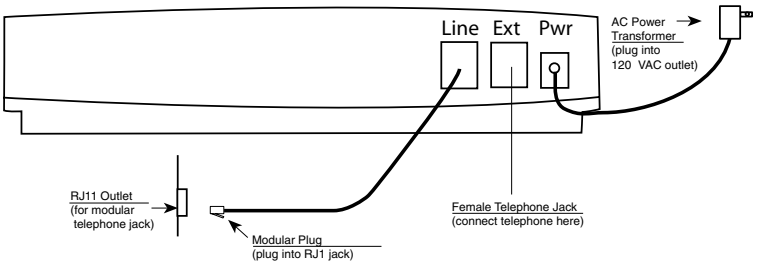
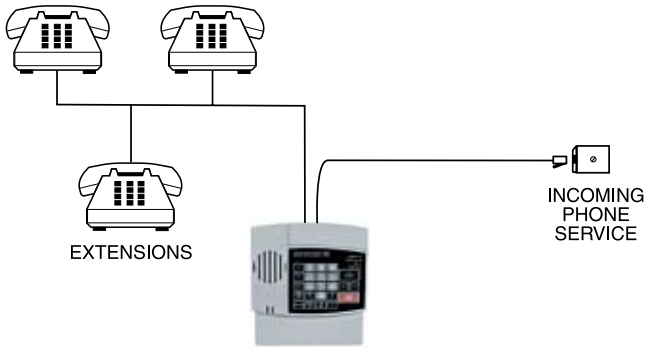


Figure 2-4. Installing the Telephone Line

On the back of the Model 400 is an extra female telephone jack labeled "EXT". This is provided so that a telephone or other answering device may be used on the same line as the unit. (It is not necessary to hook up a telephone for the Model 400 to operate.) This extension jack features Line Seizure which means that it will disconnect the extension jack when the Model 400 needs to make a telephone call. To ensure that the unit has priority over any other device on the line, you must connect all extensions to this jack. (see figure)

On the unit there are two RJ11C phone jacks:

- The RJ11C jack labeled "LINE"is to be connected to the incoming line of your phone service, ahead of all other phones or telephone extensions.
- The RJ11C telephone jack labeled "EXT" is to be connected to all extensions.



2.8 THE MICROPHONE

The Model 400 is provided with a built-in microphone which is used to monitor high sound levels produced near the installation site. The sensitivity of the microphone is configurable and will detect a continuous as well as a pulsating alarm. Note that beeping alarms that have a half second or more of silence between beeps will not be detected.

Other programming options that apply to the microphone include setting the length of time before a high sound causes an alarm.

If this sound level exists for 8 consecutive seconds (default) or for the programmed length of time, the Model 400 will dial out with an alarm message.

> **NOTE:** The proximity of the audible alarm to the microphone is extremely important.

Normally, the Model 400 and the audible alarm must be in the same room. The maximum distance can vary considerably depending on the alarm, the acoustics, and the size of the room.

During an alarm dial-out, the microphone allows four-second intervals to listen-in to sounds at the Model 400's location.

When calling for a Status Report, the microphone permits listening to on-site sounds for a programmed time interval.

2.9 ALERT ZONES

Open the input/output wiring door located above the keypad.The Model 400 can monitor up to 4 zones (represented by the numbered terminal screws shown in Figure 2-5, below).

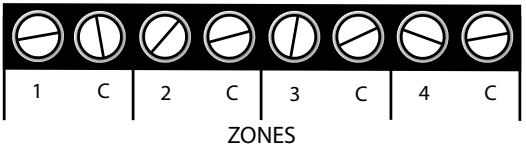


Figure 2-5 Alert Zones

Zones are configured as either dry contact or temperature. A zone configured as dry contact can be used with any normally open (N.O.) or normally closed (N.C.) device. "Open" refers to an opened circuit path; if conditions cause the circuit to close, an alert condition occurs. "Closed" refers to a continuous circuit path; if a closed circuit is opened, an alert condition occurs. The Model 400 determines the way zones are configured by the type of sensor connected to each alert zone (refer to Chapter 5.)

A zone configured as "temperature" is designed to evaluate a range of settings. The Model 400 will read the temperature at the sensor's loca-

tion and compare that value to programmed high and low temperature limits. Temperature zones must be used with Sensaphone's 2.8K Remote Temperature Sensor or weatherproof sensor.

> **NOTE:** Before wiring, it is advisable to disable the zones to prevent accidentally tripping an alarm. See Chapter 5.

Important Note regarding Ultra-Low temperature freezers:
If you are connecting the Sensaphone to an ultra low temperature freezer (-80° C) and the freezer is equipped with alarm terminals/contacts you can connect these directly to one of the zones on your Sensaphone (refer to your freezer owner's manual for proper connection).

2.10 INSTALLING THE SENSOR

After you have selected the sensor, loosen the screw of the alert zone and its corresponding common (c). Two wire leads are used to connect any monitoring sensor. Fasten one lead to the numbered screw and the other lead to C. Tighten both screws. If the zone was not disabled, the Model 400 may recite its "Alarm Exists" message as you connect the sensor. If it does, just press ALARM CANCEL to stop it. Re-enable the zone after wiring. Refer to Figures 2-6 and 2-7 for connecting a sensor to an alert zone.

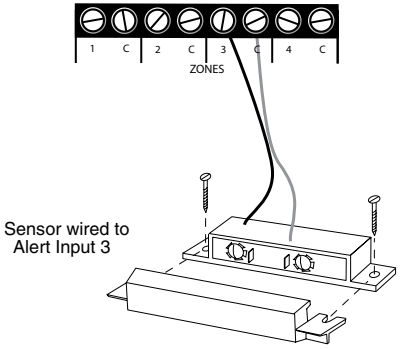


Figure 2-6. Sensor Connected to an Alert Zone

Any sensor can be attached to the Model 400 using 18-26-gauge wire (#22 recommended). The sensor can be several hundred feet from the unit, as long as the total resistance of the circuit is not greater than 50 ohms. Use wire appropriate for the application.

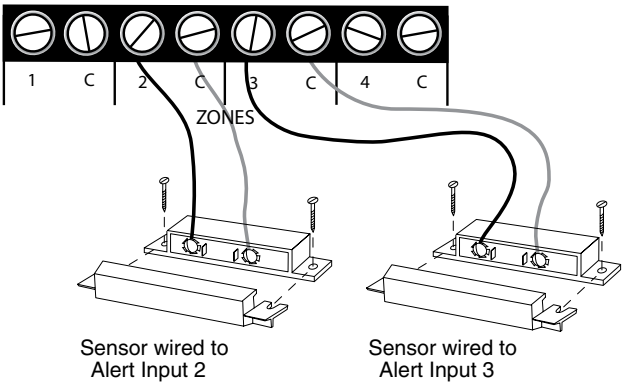


Figure 2-7 Two Sensors Wired to Adjacent Zones

NOTE: Do not use sensors, switches, or relays that supply any voltage or current to the Model 400. Be aware of proximity to other electrical wires or components when placing wires that lead from the sensors to the unit. Avoid running the wires near electrical devices that use high voltage or current, such as motors, heavy machinery, etc. This voltage may be inductively coupled into the sensor wiring and could result in damage to the the Model 400's circuitry. Try to place wires at least 6 inches from other electrical wiring or devices.

2.11 MULTIPLE SENSORS

The Model 400 may have more than one sensor connected to the same alert zone, as long as the normal condition for each sensor on the same alert zone is identical (either all N.O. or all N.C.). However, only one remote temperature sensor can be used on each zone.

When wiring several normally closed sensors on one zone, they must be connected in series. Connect one lead from the first sensor to the numbered screw of the alert zone. Next, take the other lead from the first sensor and connect it to one lead from the next sensor. Continue connecting sensors end-to-end until you have connected all of your sensors. Take the second lead from the last sensor and connect it to the common screw on the Model 400. See Figure 2-8. Multiple N.C. sensors are typically magnetic reed switches to monitor the security of windows and doors.

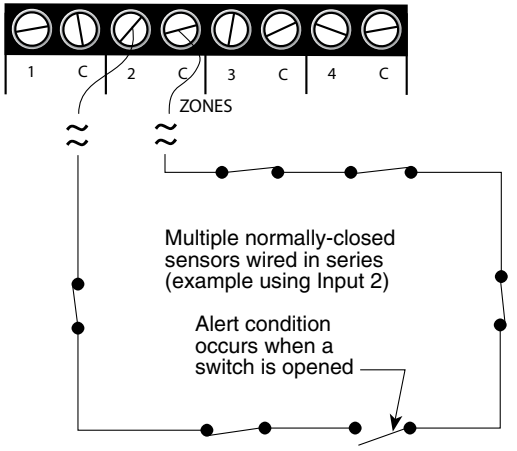


Figure 2-8. Multiple Normally Closed Sensors

To wire several normally open sensors to one alert zone, connect them in parallel. To do this, take one lead from each sensor and attach it to the numbered terminal. Then, take the second lead from each sensor and attach each to the corresponding common screw. Refer to Figure 2-9.

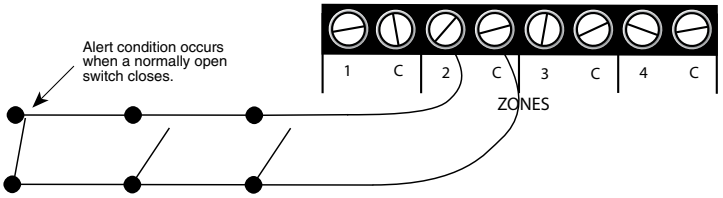


Figure 2-9 Multiple Normally Open Sensors

2.12 OUTDOOR WIRING

When wiring sensors outdoors, DO NOT allow exposed wires to run freely in open air; under such conditions, the Model 400 is susceptible to serious damage during a lightning storm. Depending upon the distance outdoor wiring must travel, consideration should be given to the use of shielded wire inside a metal conduit. Both shield and conduit should be connected to an earth ground. This prevents stray voltage from entering the unit.

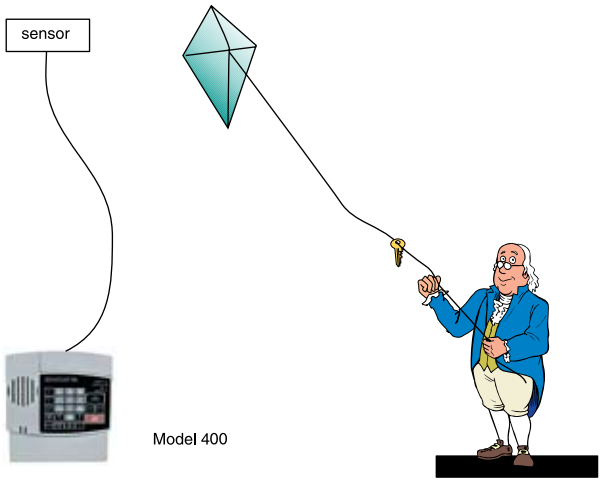


Figure 2-10. Potential Sensor Damage from Stray Electrical Noise

2.13 DISCONNECTING THE MODEL 400 FOR STORAGE OR SEASONAL USE.

If you plan to employ the Model 400 as a seasonal "watchdog" for a few months during the year, you must disconnect all wires from the unit completely to avoid damage to the circuitry when the unit is not in use. If the unit is unplugged but left in place with all the sensors still connected, the wires act as antennae that draw in any stray "electrical noise" from such devices as fans, blowers, microwaves, etc.

Additionally, it is important to remove the batteries, or they will discharge until they fail.

Preserve your Model 400 during the off-season, or when not in use:

- Remove the sensor wires at the screw terminals
- Remove the batteries
- Unplug the unit and store in a safe place

CHAPTER 3: QUICK START

This section presents a useful guide for first-time programming of the Model 400. Follow instructions for installation before attempting to program the Model 400. Refer to Chapter 2: Installation.

3.1 THE LOCAL KEYPAD

Programming is accomplished using the local keypad (shown below, Figure 3-1). Notice that a single key has several functions assigned to it; programming results are determined by the order in which keys are pressed.

Individual keystrokes are illustrated to show programming steps in the correct order. If you make a mistake by entering the wrong key, do not press another key until you hear the message "Error 1." Then, start over with the first key in the programming sequence.

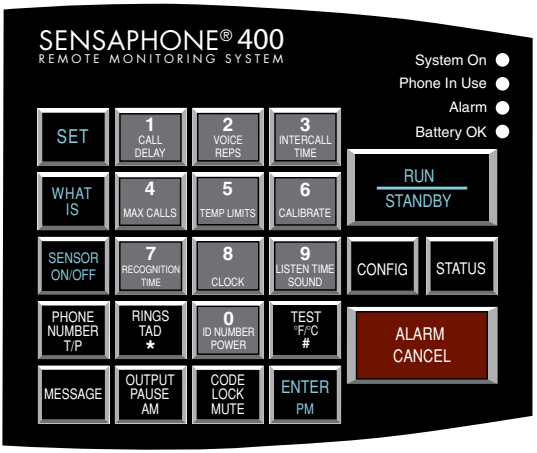


Figure 3-1. The Model 400 Keypad

3.2 PREPARATION FOR PROGRAMMING

Read complete instructions in Chapter 2: Installation, and make sure to follow these three steps first:

1. Plug the AC adapter into the 120 VAC outlet.

2. Install the batteries.

3. Connect the Model 400 to a telephone line.

When these steps are completed, the Model 400 is fully operational and able to monitor temperature, high sound, AC power failure and battery backup condition; it can also be called on the telephone for a Status Report or be used for listening to on-site sounds from any remote location. Now, the unit is ready for programming.

3.3 QUICK-START PROGRAMMING STEPS

STEP 1: SET CONFIGURATION OF ZONES

The Model 400 will scan the 4 external zones and determine if they are N.O. (normally open), N.C. (normally closed), or Temperature. If external sensors are added, make sure they are in their normal positions before proceeding—refer to Chapter 5, Section 5.1.

1. Press STANDBY to place the Model 400 in Standby mode.

2. If you have external sensors available, wire the sensors to the zones on the back of the Model 400 (see Chapter 2, Section 2.10). Otherwise, skip this step and move to step 3.
3. Press RUN. The System On light glows when the Model 400 returns to Run mode.

4. Press SET.

5. Press CONFIGURE.

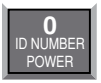
6. The Model 400 will audibly recite the new configuration for each of the four zones, responding with "normally open", "normally closed", or "Temperature." If a zone is unused, it is treated as normally open.

STEP 2: SET THE ID NUMBER

It is recommended that you set the ID number to reflect the telephone number on which the Model 400 is installed.

1. Press SET

2. Press ID NUMBER.



3. Using the number keys, enter the digits (up to 16 are permitted) for the ID number. The Model 400 will recite the digits as they are pressed.

4. Press ENTER. The 400 will respond: "Okay."

STEP 3: SET DIAL-OUT TELEPHONE NUMBERS

To program dial-out telephone numbers:

1. Press SET.

2. Press PHONE NUMBER.

3. Select which telephone number to program. Press any unassigned number key (from 1 to 8) to represent the new telephone number entry. Model 400 will respond: "Enter number."

4. Enter the complete telephone number using the number keys.

The Model 400 will recite the digits as they are pressed.

5. Press ENTER. The unit will respond: "Okay."

6. Repeat above procedure to program up to four separate telephone numbers.

STEP 4: SET TEMPERATURE LIMITS

High and low temperature limits can be separately programmed for each zone that is configured as temperature. Limits can range from –20° to +150°F, or from –30° to 65°C. Default settings are: 10° F for low temperature and 100° F for high temperature. Do not set temperature limits too close to normal room temperature, since minor fluctuations could result in frequent and unnecessary alarm dialouts.

1. Press SET.

2. Press TEMP LIMITS.

3. Using the number keys, press a number (from 1 to 4) that corresponds to the temperature zone being programmed.

The Model 400 responds: “Enter low temperature limit.”

4. Using the number keys, enter a value for low temperature limit. The Model 400 will recite the digits as they are pressed. If a negative number is required, first press *, then enter the number.

5. Press ENTER.

The Model 400 responds: “Enter high temperature limit.”

6. Using the number keys, enter the value for high temperature limit. The Model 400 will recite the digits as they are pressed.

7. Press ENTER. The Model 400 responds: “Enter.”

This concludes minimum programming to achieve normal operation of the Model 400. In addition to the programming just accomplished, default settings for many more features take effect when the unit is first powered. You will be able to reprogram most of these factory-set defaults to suit your application.

For a complete explanation of each feature (with illustrations of key-strokes), refer to Chapter 4: Communications Programming and Chapter 5: Alarm Programming.

To gain a basic understanding of how the alarm dial-out feature works, refer to this chapter, Section 3-4. For extended information regarding dial-out and related programmable parameters, refer to Chapter 7: Operation.

3.4 SUMMARY OF THE ALARM DIAL-OUT PROCESS

Action—Response	Programmable Feature
1. THE MODEL 400 DETECTS AN ALERT CONDITION An alert condition is not the same as a valid alarm—the condition must continue for the programmed time period, or ***Recognition Time***, before it is recognized as a valid alarm.	• **Recognition Time** This is the programmed waiting period to determine if an alert condition has persisted long enough to be considered a valid alarm. If the sensor returns to normal within recognition time, then no alarm will occur.
2. A VALID ALARM IS CONFIRMED An audible, on-site alarm message begins and continues until the alarm is acknowledged. (If the Mute feature is turned on, there is no on-site message.) ***Call Delay*** is activated.	• **Call Delay** This is the programmed waiting period, before the first telephone number is called, to report an alarm.
3. DIAL-OUT BEGINS Dial-out begins by calling telephone number 1 to report an alarm. If there is no acknowledgment, the Model 400 waits the programmed ***Intercall Time*** before dialing subsequent telephone numbers. Dial-out continues in this manner, cycling through the remaining telephone numbers, for the programmed ***Max Calls***.	• **Intercall Time** This is the programmed waiting period, in between sequential dialing of telephone numbers, to report an alarm.

4. THE ALARM IS ACKNOWLEDGED When the alarm is acknowledged, the dial-out process is cancelled and the audible, on-site alarm message stops.	• **Max Calls** This is the total number of telephone calls that will be dialed in response to any valid alarm. Telephone numbers are dialed sequentially, and continue to cycle until the maximum number of calls is reached. If no acknowledgment occurs, then at the completion of Max Calls, all alarms are automatically acknowledged.

CHAPTER 4: COMMUNICATIONS PROGRAMMING

This chapter explains the keypad commands for communications programming of the Model 400, including interrogation and resetting of the following:

- Voice Messages
- The Unit ID Number
- Dial-out Telephone Numbers
- Tone or Pulse Dialing
- Special Dialing with Pagers, Beepers and Access Numbers.
- Dial-out test mode
- Rings Until Answer
- Telephone Answering Device Compatibility
- Listen-in Time
- Call Delay
- Local Voice Mute
- Voice Repetitions
- Intercall Time
- Maximum Number of Calls
- The Clock
- Security Code

4.1 VOICE MESSAGES

The 400's digital speech recording feature allows you to record custom messages for each of the four Zones and an ID Message. This means that when the 400 calls you during an alarm, you will hear a personalized Voice Message identifying the unit and telling you exactly what alarm condition exists. You can record a separate message for each of the four Zones. The message can run a maximum of 5 seconds. The ID Message can be a maximum of 8 seconds. You can shorten the message length by pressing the ENTER key after reciting the message.

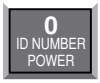
The **ID Message** is used to identify the unit. This could be a particular building name, its location (address or city), or some other identifier.

To program the ID Message:

1. Press the SET key.

2. Press the MESSAGE key. The 400 will say "Enter Message Number."

3. Press the ID key (number 0 key).



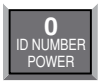
4. When the unit beeps, begin speaking your message into the microphone. The unit will say "OK," when the recording time has elapsed; then it will play back your recorded message.

To play back the ID Message:

1. Press the WHAT IS key.

2. Press the MESSAGE key.

3. Press the ID key (number 0 key).



The 400 will play back your recorded message.

The Zone Messages are used to identify the device or condition being monitored such as temperature, humidity, equipment alarms, security alarms, etc.

To program the Voice Message for a Zone:

1. Press the SET key.

2. Press the MESSAGE key. The 400 will say, "Enter Message Number."

3. Press the number key for the corresponding Zone.

4. When the unit beeps, begin speaking your message into the microphone. The unit will say "OK," when the recording time has elapsed; then it will play back your recorded message.

To play back the message for a Zone:

1. Press the WHAT IS key.

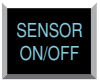
2. Press the MESSAGE key.

3. Press the corresponding Zone number key.

The 400 will play back your recorded message.

To erase a Zone or ID message:

1. Press the SENSOR ON/OFF key.



2. Press the MESSAGE key.

The 400 will say "Enter message number."

3. Press the Zone Number or ID key.

The 400 will say, "Message erased."

4.2 THE UNIT ID NUMBER

The Unit ID Number is the identification number of the Model 400. This number is typically the telephone number where the unit is installed, or it may be designated using any number that best suits your application.

The purpose of the Unit ID Number is to immediately provide the source of any alarm, especially when using multiple Model 400 units in a complex monitoring system. When the Model 400 is called from a remote location, it always begins its message with the identification number:

"Hello, this is (Unit ID Number)."

4.2.1 PROGRAMMING THE ID NUMBER

To program the ID Number:

1. Press SET.

2. Press ID NUMBER.

3. Using the number keys, enter up to 16 digits for the ID number. The Model 400 will recite the digits as they are pressed.

4. Press ENTER. The Model 400 will respond: "Okay."

4.2.2 INTERROGATING THE ID NUMBER

To interrogate the ID numbers:

1. Press WHAT IS.

2. Press ID NUMBER. The Model 400 will recite the Unit ID Number programmed.

4.3 DIAL-OUT TELEPHONE NUMBERS

The Model 400 can store up to four 48-digit phone numbers. These are the numbers that will be called during alarm dial-out. In the event of an alarm, the numbers are dialed sequentially, 1 through 4. Begin programming the first telephone number by assigning it to the key labeled with the number 1 on the keypad, and continue to assign any other telephone numbers in numerical order. A pause, pound or star can be added to an individual phone number to access different phone and beeper systems. See Special Dialing, Section 4.5.

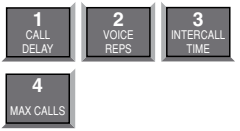
4.3.1 PROGRAMMING DIAL-OUT TELEPHONE NUMBERS

To program dial-out telephone numbers:

1. Press SET.

2. Press PHONE NUMBER.

3. Select which telephone number to program. Press any unassigned number key (from 1 to 4) to represent the new telephone number entry. The Model 400 will respond: "Enter number."



4. Enter the complete telephone number using the number keys.

5. Press ENTER. The unit will respond with "Okay."

6. Repeat above procedure to program up to four separate telephone numbers.

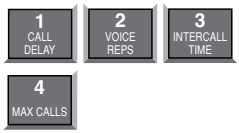
4.3.2 INTERROGATING A DIAL-OUT TELEPHONE NUMBER

To interrogate dial-out telephone numbers:

1. Press WHAT IS.

2. Press PHONE NUMBER.

3. Press a number key (from 1 to 4).



Model 400 will recite the corresponding telephone number. If there is no number programmed for a particular key, the unit will respond: "No number."

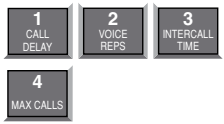
4.3.3 ERASING A TELEPHONE NUMBER

To erase a telephone number:

1. Press SET.

2. Press PHONE NUMBER.

3. Press the number key (from 1 to 4) representing the telephone number you want to erase.



4. Press ENTER. The Model 400 will say "Number # erased."

4.4 DIAL-OUT TEST MODE

The 400 allows you to test your telephone programming by simulating an alarm dialout to any programmed telephone number. This can be a valuable tool for insuring that your programming is correct and also for troubleshooting dialing problems. In this mode all signals on the telephone line are audible through the local speaker.

4.4.1 TO TEST A DIALOUT PHONE NUMBER:

1. Press the SET key.

2. Press the TEST key.

The 400 will say "Enter Number."

3. Press a number key (1–4) corresponding to the phone number entry you wish to test, and press ENTER.

The 400 will dial the number and announce the date and time for voice calls, or send its ID number for pager calls.

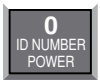
4.4.2 MANUALLY DIAL A TELEPHONE NUMBER

1. Press the SET key.

2. Press the TEST key.

The 400 will say "Enter number."

3. Press 0 then ENTER to enter manual dialing mode. The 400 will go off-hook and you should hear a dial tone through the speaker. Press any number keys to dial a telephone number.



4. Press ALARM CANCEL to hang up and exit the test.

4.5 TONE OR PULSE DIALING

The Model 400 can dial out in pulse or Touch Tone™. Select the type of dialing, in either pulse or tone, depending upon the type of service provided by your telephone company. The default is tone.

To program for either pulse or tone:

1. Press the SENSOR ON/OFF key.

2. Press PHONE NUMBER T/P.

The Model 400 will respond: "Tone" to indicate that tone dialing is enabled, or "Pulse" to indicate that pulse dialing is on and enabled.

3. Repeat key sequence to switch between settings.

4.6 SPECIAL DIALING

The Model 400 has provisions for special dialing sequences. Special dialing sequences allow:

- Dialing that requires an access number to connect with an outside line.
- Dialing that requires the pound (#) or star (*).
- Dialing to a beeper or pager.

4.6.1 SPECIAL DIALING KEYS

The following designated keys represent special functions when used with PHONE NUMBER entries:

1. Pause

PAUSE represents a two-second pause in dialing. It can be used when an access number is required before dialing to an outside line. (For example, in some cases a "9" or other number, must be dialed first, in order to get a dial tone for an outside line.)

2. Pound (#)

A pound may be required when calling some phone or beeper systems.

3. Star (*)

A star may be required when calling some phone or beeper systems.

4. Code

The CODE key can be used to perform special functions during the dialing sequence. These include: Pager dialing, Wait for Answer, and Switch to Touch-tones. These functions enable the Sensaphone to send a numeric page, or dial a telephone number + office extension, or combine pulse & touch-tone dialing in the same telephone number. Multiple codes can be used during telephone number programming if required. See section 4.5.4 for special instructions on dialing to a beeper or pager.

Code 1 Pager

When CODE + 1 is inserted as the first digit of the telephone number, the Model 400 will make a pager call. This means that the unit will expect the call to be answered by a paging service provider, then it will send its ID number (using touch-tones), followed by the digits that identify the zone(s) in alarm. The unit will hang-up after it completes the call. See section 4.5.4 for specific programming examples for dialing a pager.

Code 2 Wait-For-Answer

You can force your Sensaphone to Wait-For-Answer in the middle of dialing a telephone number. This is useful when calling a telephone extension that is initially answered by an auto-attendant. By inserting the wait-for-answer code you can instruct your Sensaphone to call the main number, then wait for an answer by the auto-attendant, then dial the extension. The Sensaphone will not speak it's voice message until the telephone is answered at the extension.

Example:

SET + PHONE NUMBER + any unassigned number key 1-4

+ telephone number + CODE + 2 + extension number + ENTER

Code 3 Switch to Touch-tone

This command allows you to change from pulse dialing to touch-tone dialing in the middle of dialing a telephone number. This is useful when your telephone service only supports pulse dialing, but you need to send touch-ones after connecting – such as when dialing a numeric pager or navigating a voice menu.

Example:

In this example a telephone number is dialed, the Sensaphone waits for the call to be answered, then changes to touch-tones to dial an extension.

SET + PHONE NUMBER + any unassigned number key 1-4 +

telephone number + CODE + 2 + CODE + 3 +

extension number + ENTER

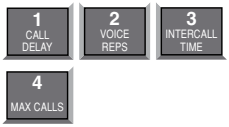
4.6.2 INCORPORATING A PAUSE

Incorporate PAUSE to access an outside telephone line:

1. Press SET.

2. Press PHONE NUMBER.

3. Press any unassigned number key (from 1 to 4) to represent the new telephone number entry. Model 400 will respond: "Enter number."



4. From the number keys, enter the access digit (i.e., 9). The Model 400 will recite the digit.

5. Press PAUSE. The Model 400 will "pause."

6. Enter the complete telephone number using the number keys. The Model 400 will recite the digits as they are pressed.

7. Press ENTER. The Model 400 will say "Okay."

4.6.3 INCORPORATING A POUND (#) OR STAR (*)

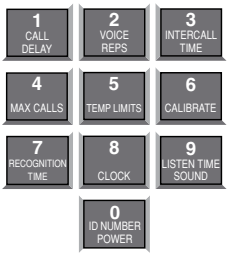
Incorporate a pound or star if it is normally included in telephone number:

1. Press SET.

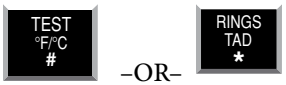
2. Press PHONE NUMBER.

3. Press any unassigned number key (from 1 to 4) to represent the new telephone number entry. Model 400 will respond: "Enter number."

4. Enter the telephone number using the number keys. The Model 400 will recite the digits as they are pressed.



5. Position the pound (#) or star (*) within the telephone number where required by pressing the designated keys. The Model 400 will say "pound" or "star" each time the key is pressed.



6. Enter any remaining digits of the telephone number.

7. Press ENTER. The Model 400 will say "Enter."

4.6.4 SPECIAL DIALING TO A BEEPER OR PAGER

Your Sensaphone can be programmed to send an alarm message to a numeric beeper/pager. The message will include the Sensaphone's telephone number (ID number) and the Zone numbers that are in alarm. For example, if zones 1 and 4 are in alarm, the message on your pager would be: 8882227777-1-4, where 8882227777 is the unit's ID number. A Sound alarm will appear as alarm -9 and a Power alarm will appear as alarm -0. To program a telephone number for Pager dialout, you must enter Code 1 at the beginning of the telephone number. The Sensaphone will say "Code one, Pager" when you enter the command.

Follow the key sequence below to dial a numeric pager:

SET + PHONE NUMBER + any unassigned number key 1-4 +

CODE + 1 + pager telephone number + ENTER

To check your programming:

WHAT IS + PHONE NUMBER + assigned # 1-4

The Sensaphone will say "Pager", followed by the programmed telephone number.

To send a test page:

SET + TEST + assigned # key 1-4 + ENTER

The Sensaphone will let you listen to the dialout sequence through its speaker and send you a message that includes the Sensaphone's telephone number (ID number).

Voice Prompted Paging Systems

If your paging provider is answered by a voice prompt which requires you to enter one or more touch-tones to send a message, then use the wait-for-answer code (4.5.1) in combination with the Pause key and other number keys to navigate the voice menu until you reach the message entry point. The Sensaphone will automatically send it's telephone number, Zone numbers, and a pound (#) tone at the end of the number. For assistance contact Sensaphone Technical Support at 1(877)373-2700.

4.7 RINGS UNTIL ANSWER

Rings Until Answer is the programmed number of times the telephone rings before the Model 400 will answer an incoming call. This can be set from 1 to 15 rings. The default value is 4.

4.7.1 PROGRAMMING RINGS UNTIL ANSWER

To program Rings Until Answer:

1. Press SET.

2. Press RINGS/TAD. The Model 400 will respond: "Enter number."

3. Using the number keys, enter a value.

4. Press ENTER. The Model 400 will respond: "Okay."

4.7.2 INTERROGATING RINGS UNTIL ANSWER

To interrogate Rings Until Answer:

1. Press WHAT IS.

2. Press RINGS/TAD.

4.8 TAD (TELEPHONE ANSWERING DEVICE)

The TAD feature is especially useful because it integrates the operation of the Model 400 with your telephone answering device (e.g. answering machine) in a way that retains the full flexibility of each system. This allows you to have on-demand telephone access to the Model 400, for obtaining a Status Report, or for issuing call-in commands, while your telephone answering device is set to receive outside calls. Programming for use with a telephone answering device (TAD) is always used in conjunction with Rings Until Answer, detailed in section 4.6.

NOTE: The TAD feature only applies to answering devices connected to the same telephone line as the Model 400.

4.8.1 TAD ENABLE/DISABLE

To enable/disable the TAD feature:

1. Press SENSOR ON/OFF.

2. Press RINGS/TAD.

The Model 400 will respond: "TAD On." (If the Model 400 says "TAD Off," repeat steps 1 and 2 to reactivate TAD.)

4.8.2 USING THE TAD FEATURE

1. Make sure the TAD feature is enabled on the Model 400. (The default setting is disabled, so you must enable it first.)
2. Determine the number of rings your telephone answering device uses to answer the telephone. (Most answering devices require 4 rings; others are selectable.)
3. On the Model 400, program Rings Until Answer to a greater number than the number of rings set on your answering machine.

Example:

Telephone answering device, rings = 4

Model 400, Rings Until Answer = 6

Using the procedure just outlined, all incoming calls will be answered by the telephone answering device, allowing it to operate normally. With the programming just accomplished, the Model 400 can be accessed remotely, by telephone, to obtain the Status Report.

1. Dial the telephone number of the Model 400.

2. Let the telephone ring once and then hang up.

3. Wait approximately ten seconds

4. Call the Model 400 back.

It will answer the telephone on the first ring.

Explanation: The pattern of one ring, followed by a second call (within 30 seconds), signals the Model 400 to answer your incoming call, bypassing the telephone answering device.

> **NOTE:** Special Case: If the Model 400 shares the same line with a telephone answering device, and during certain time periods, frequent, incoming calls are expected on that line, then you may want to temporarily disable the TAD feature. If you leave the TAD enabled, it will not adversely affect normal operation, but if two outside telephone calls are received within the same 30-second time window, the Model 400 will interpret this pattern as a signal to answer the telephone. If this occurs, press any key on the Model 400 to hang up.

4.8.3 NO TAD IN USE

If a telephone answering device is not used on the same telephone line as the Model 400, make sure that the TAD feature is disabled, or turned off. Only Rings Until Answer programming will determine how incoming calls are answered. For example, if you program Rings Until Answer to 3, incoming calls will be answered in 3 rings.

4.9 LISTEN-IN TIME

The Listen-in Time is the amount of time you can listen to sounds from the Model 400's built-in microphone at its installation site. When you call in for a Status Report, the Model 400 announces Listen-in Time at the end of its first round of status readings, saying, "Listen for (programmed time entered)." The programmable range is from 0 to 255 seconds (or up to 4.17 minutes). The default value is 15 seconds.

> **NOTE:** The microphone is also used to monitor high sound level. See Chapter 5, Section 5.10 through Section 5.11.1.

4.9.1 PROGRAMMING THE LISTEN-IN TIME

To program the Listen-in Time:

1. Press SET.

2. Press LISTEN TIME. The Model 400 will respond: "Enter seconds."

3. Using the number keys, enter the seconds. The Model 400 will recite the digits as they are pressed.

4. Press ENTER. The Model 400 will respond: "Okay."

4.9.2 INTERROGATING THE LISTEN-IN TIME

To interrogate the Listen-in Time:

1. Press WHAT IS.

2. Press LISTEN TIME. The Model 400 will recite the listen-in time.

4.10 CALL DELAY

Call Delay is the programmed length of time the Model 400 waits, following detection of an alarm, before it begins the dial-out sequence. This applies only to the first call. (Delay time between calls is also programmable: refer to Intercall Time, Section 4-12.)

The purpose for Call Delay is to allow time for personnel at the Model 400's installation site to respond to and cancel an alarm before dial-out begins. During this time, the Model 400 will audibly repeat its "alarm" message (unless the Local Voice Mute feature has been activated—refer to Section 4.10). The default for Call Delay is 30 seconds. Call Delay can be programmed from 0 seconds to 60 minutes (1 hour).

4.10.1 PROGRAMMING THE CALL DELAY

To program the Call Delay:

1. Press SET.

2. Press CALL DELAY.

The Model 400 will respond: “Enter minutes.”

3. Using the number keys, enter the minutes.

The Model 400 recites the digits as they are pressed.

4. Press ENTER. The Model 400 responds: “Enter seconds.”

5. Using the number keys, enter the seconds. The Model 400 recites the digits as you press them.

6. Press ENTER. The Model 400 responds: “Okay.”

4.10.2 INTERROGATING CALL DELAY

To interrogate Call Delay:

1. Press WHAT IS.

2. Press CALL DELAY.

The Model 400 will recite the programmed Call Delay.

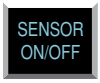
4.11 LOCAL VOICE MUTE

When the Model 400 dials out to report an alarm, it also audibly recites the alarm message through it's speaker. The Local Voice Mute command allows you to turn off the speaker at the Model 400's site during alarm dialouts and status call-ins. This feature is used to prevent intruders or unauthorized persons from hearing the alarm dial-out message or from hearing the Status Report during an off-site call.

4.11.1 ENABLE/DISABLE LOCAL VOICE MUTE

To enable/disable Local Voice Mute:

1. Press SENSOR ON/OFF.



2. Press MUTE.

The Model 400 will say "Mute On" to indicate that Local Voice Mute is enabled, or "Mute Off" to indicate that it is disabled.

3. Repeat key sequence to switch between enabled or disabled Local Voice Mute.

4.12 VOICE REPETITIONS

The Voice Repetitions feature allows programming of the number of times the alarm message is repeated per phone call during alarm dial-out.

The maximum repetitions may be set to 10; the default is 3 repetitions.

4.12.1 PROGRAMMING VOICE REPETITIONS

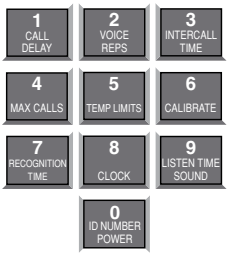
To program Voice Repetitions:

1. Press SET.

2. Press VOICE REPS.

The Model 400 will respond: "Enter number."

3. Using the number keys, enter a value from 1 to 10.



4. Press ENTER. The Model 400 will respond: "Okay."

4.12.2 INTERROGATING VOICE REPETITIONS

To interrogate Voice Repetitions:

1. Press WHAT IS.

2. Press VOICE REPS.

The Model 400 will recite the number programmed.

4.13 INTERCALL TIME

The Intercall Time is the programmable period of time the Model 400 waits in calling subsequent telephone numbers. Intercall Time is activated only after alarm dial-out to the first telephone number fails to be acknowledged. This period can be programmed from 10 seconds to 60 minutes. The default intercall time is 1 minute.

If an incoming telephone call is made to the Model 400 during Intercall Time (in between its dialing of subsequent telephone numbers to report an alarm), it will answer the incoming call and immediately report any existing alarms.

4.13.1 PROGRAMMING INTERCALL TIME

To program Intercall Time:

1. Press SET.

2. Press INTERCALL TIME.

The Model 400 will respond: "Enter minutes."

3. Using the number keys, enter the minutes.

The Model 400 recites the digits as you press them.

4. Press ENTER. The Model 400 will respond: "Enter seconds."

5. Using the number keys, enter the seconds. The Model 400 recites the digits as you press them.

6. Press ENTER. The Model 400 responds: "Okay."

4.13.2 INTERROGATING INTERCALL TIME

To interrogate Intercall Time:

1. Press WHAT IS.

2. Press INTERCALL TIME.

The Model 400 will recite the programmed Intercall Time.

4.14 MAXIMUM NUMBER OF CALLS (MAX CALLS)

The Max Calls feature controls the total number of repeated calling attempts by the Model 400 in the event of an alarm. When an alarm occurs, the dial-out process begins, and continues to cycle through your programmed telephone numbers until the alarm is acknowledged or until the maximum number of calls is reached. The Max Calls setting regulates the number of calls that will be made as a result of any alarms; if more than one alarm is detected at once, or if a second alarm occurs during dial-out on the first alarm, the Max Calls setting will start the calling process from zero, until the programmed number of calling attempts are completed.

The default setting for Max Calls is 100, but it may be programmed from 1 to 255 calls. Max Calls is cancelled when an alarm is acknowledged. If the maximum number of calls is completed and no alarm acknowledgement has occurred, the Model 400 will automatically acknowledge any alarm and stop the dial-out.

> **NOTE:** If only one telephone number is programmed, the Model 400 will dial out a maximum of 15 times to report an alarm in accordance with FCC rules.

4.14.1 PROGRAMMING MAX CALLS

To program Max Calls:

1. Press SET.

2. Press MAX CALLS.

The Model 400 will respond: "Enter number."

3. Using the number keys, enter a value. The Model 400 will recite the digits as you press them.

4. Press ENTER. The Model 400 responds: “Okay.”

4.14.2 INTERROGATING MAX CALLS

To interrogate Max Calls:

1. Press WHAT IS.

2. Press MAX CALLS.

The Model 400 will recite the value set for Max Calls.

4.15 THE CLOCK

The Model 400 has a built-in clock. The power-up time is 12 am. The clock will keep time from 12 am until you program the current time. It will then keep time from your programmed time. If the AC power fails, the clock will continue to keep time until the battery back-up fails. It will then reset to 12 am when power is restored. An incorrect time is a good indication that the power has failed and the batteries have been expended.

4.15.1 SETTING THE CLOCK

To set the clock:

1. Press SET.

2. Press CLOCK.

3. Using the number keys, enter the correct time. The Model 400 will recite the digits as they are pressed.

4. If the time is AM, press the AM key. The Model 400 will say "am" If the time is PM , press the PM key. The Model 400 will say "pm."

Example: You want to set the clock to 9:45 am. Press the following keys in the order shown:

SET + CLOCK + 9 + 4 + 5 + AM

4.15.2 INTERROGATING FOR THE CURRENT TIME

To interrogate the Model 400 for the current time:

1. Press WHAT IS.

2. Press CLOCK. The Model 400 will recite the current time.

4.16 THE SECURITY CODE

The Security Code is the last step after setting all other programming parameters for the Model 400. The code consists of a 4-digit number you select and will effectively prevent unauthorized changes to the Model 400's programming. When the Security Code is activated, all keyboard programming is locked. The Model 400 may be interrogated using the WHAT IS key, but the keyboard must be unlocked, via the Security Code, before any programming changes are possible.

4.16.1 LOCKING THE KEYPAD

To program the Security Code:

1. Press SET.

2. Press CODE.

The Model 400 will say "Enter security code."

3. Using the number keys, enter 4 digits.

4. Press ENTER.

The Model 400 says, "OK." The keyboard is now locked.

If unauthorized persons attempt to set a parameter, an error message, "Error 2," is returned. Whenever any operation except WHAT IS takes place without entering the security code first, this error message occurs.

4.16.2 UNLOCKING THE KEYPAD

To unlock the keyboard:

1. Press WHAT IS.

2. Press CODE.

The Model 400 will say "Enter Security Code."

3. Using the number keys, enter the digits for the code.

4. Press ENTER.

If the correct code is entered, the Model 400 will say "OK." If the wrong code is entered, the Model 400 will say "Error 2."

CHAPTER 5: ALARM PROGRAMMING

This chapter explains the alarm programming and monitoring capabilities of the Model 400, with specific instructions for the following features:

- Configure zones as dry contact or temperature
- Enable/disable zones
- Program alarm Recognition Time for each zone
- Program high and low temperature limits
- Disable alarm response to high or low temperature
- Program temperature in Fahrenheit or Celsius scale
- Calibrate temperature
- Obtain current temperature
- Program AC power-failure Recognition Time
- Enable/disable AC power monitoring
- Program sound level sensitivity
- Program high sound Recognition Time
- Disable alarm response to high sound
- Use Exit Delay via Status Report

5.1 ZONE CONFIGURATION

In preparing the Model 400 to sense an alert condition, the zones must be configured as dry contact (either open or closed) or as temperature zones. The default setting for zone 1 is temperature; for zones 2-4, the default is dry contact and open. To configure zone normality, sensors are first wired to the terminal strip at the back of the unit. (Refer to Chapter 2, Section 2.9–2.12, for an explanation on wiring zones.)

The configuration process directs the Model 400 to initialize the 4 zones and establish normal settings. Any change in the status of a zone (for example, from a normally open contact to a suddenly closed contact) is recognized as an alert condition. In the case of a temperature zone, an alert condition is recognized when established temperature limits are exceeded.

> **NOTE:** Before starting keyboard commands to configure zone normality on the Model 400, it is very important to check that the sensors you have wired to the unit are set in their normal, non-alarm positions. For example, if a magnetic reed switch (a normally-closed sensor used to detect unauthorized entry) has been wired to the Model 400, make sure that the door or window to be monitored is shut before configuring the zone. If a motion-detector is wired to the unit, it is advisable to block all sources of motion from the sensor before and during configuration.

5.1.1 PROGRAMMING ZONE CONFIGURATION

1. Press STANDBY to place the Model 400 in Standby mode.

2. Wire sensors to the zones to the back of the Model 400 (see Chapter 2, Section 2.10).
3. Press RUN. The red light glows when the Model 400 returns to Run mode.

4. Press SET.

5. Press CONFIG.

6. The Model 400 audibly recites the configuration for each of the four zones:

- If the zone is open, the Model 400 recites the number of the zone and says "normally open."
- If the zone is closed, the Model 400 recites the number of the zone, and says "*normally closed*."
- If the zone is configured as temperature, the Model 400 recites the number of the zone, followed by "Temperature."

5.1.2 INTERROGATING ZONE CONFIGURATION

1. Press WHAT IS.

2. Press CONFIG.

The Model 400 will audibly recite the configuration of each zone.

5.2 ENABLE/DISABLE ZONES

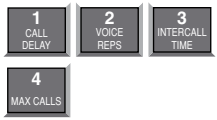
This function allows you to enable or disable a zone's response to an alert condition. An enabled zone will respond to an alert condition and allow dial-out. A disabled zone will cause dial-out to be suppressed, but any existing alert conditions will be revealed during the Status Report. Enable/disable programming is useful during wiring of zones (see Chapter 2) or when a condition needs to be monitored, but is not critical enough to be programmed for dial-out reporting. It is important to verify zone status after performing any task that requires disabling. The default setting for all zones is enabled (ON).

If an alert condition exists when zones are re-enabled, Recognition Time will restart—refer to Section 5.3.

5.2.1 CHANGING ENABLED/DISABLED ZONE STATUS

1. Press SENSOR ON/OFF.

2. Press the number (1 to 4) of the selected zone to enable/disable. The Model 400 says "Alarm Disabled" to indicate disabled or "Alarm Enabled" to indicate enabled.



5.2.2 VERIFYING ENABLED/DISABLED ZONE STATUS

1. Press WHAT IS.

2. Press STATUS.

The Model 400 audibly recites the current status of every zone. In a Status Report, each zone is first identified by its zone number, followed by a report that specifies parameters currently affecting that zone. If a zone is disabled, the word "Alarm Disabled" immediately follows the number recited for that zone.

For example, zone 3 is configured as a normally open, dry contact zone. During the Status Report:

- If disabled, the Model 400 recites:

"Zone 3, the Alarm is Disabled" for zone 3.

- If enabled, the Model 400 recites:

"Zone 3—OK," for zone 3.

In another example, zone 2 is configured as a temperature zone. The current temperature is 76 degrees. During a Status Report:

- If disabled, the Model 400 recites:

"Zone 2, the alarm is disabled, it is now 76 degrees fahrenheit—OK"

- If enabled, the Model 400 recites:

"Zone 2—76 degrees fahrenheit—OK."

5.3 ZONE RECOGNITION TIME

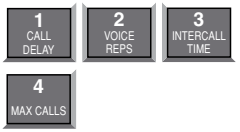
The Zone Recognition Time is the length of time an alert condition must be present before a valid alarm exists and dial-out is activated. This time period is programmable, from 0 minutes, 0 seconds (for immediate response) up to a period of 540 minutes, 0 seconds. If an alert condition begins and then clears within the established Recognition Time, no dial-out will occur. When an alert condition continues beyond the programmed Recognition Time, the Model 400 initiates dial-out. The default setting for Zone Recognition Time is 0 minutes, 3 seconds.

5.3.1 PROGRAMMING ZONE RECOGNITION TIME

1. Press SET.

2. Press RECOGNITION TIME.

3. Press the number (1 to 4) of the selected zone to be programmed.



The Model 400 responds: "Enter minutes."

4. Using the number keys, enter the minutes. For example, to set a Recognition Time of five minutes, simply press "5" on the keypad. The Model 400 recites the digits as they are pressed.

5. Press ENTER. The Model 400 responds: "Enter seconds."

6. Using the number keys, enter the seconds. The Model 400 recites the digits as they are pressed.

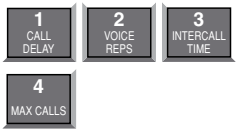
7. Press ENTER. The Model 400 responds: "Okay."

5.3.2 INTERROGATING ZONE RECOGNITION TIME

1. Press WHAT IS.

2. Press RECOGNITION TIME.

3. Press the corresponding zone key (1 to 4).



The Model 400 recites the programmed Recognition Time for that zone.

5.4 ESTABLISHING HIGH AND LOW TEMPERATURE LIMITS

High and low temperature limits can be separately programmed for each zone configured as temperature. Limits can range from –20° to +150° Fahrenheit, or from –30° to 65° Celsius.

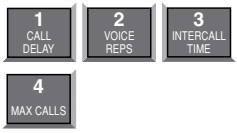
When temperature limits exceed high or low settings, the Model 400 will dial out with an alarm message. Default settings are: 10° F for low temperature and 100° F for high temperature.

5.4.1 PROGRAMMING TEMPERATURE LIMITS FOR A SELECTED ZONE

1. Press SET.

2. Press TEMP LIMITS.

3. From the number keys, press a number (from 1 to 4) that corresponds to the temperature zone being programmed.



The Model 400 responds: "Enter low temperature limit."

4. Using the number keys, enter a value for low temperature limit. The Model 400 will recite the digits as they are pressed. If a negative number is required, first press *, then enter the number.

5. Press ENTER.

The Model 400 responds: “Enter high temperature limit.”

6. Using the number keys, enter the value for high temperature limit. The Model 400 recites the digits as they are pressed.

7. Press ENTER. The Model 400 responds: “Enter.”

NOTE: Do not set temperature limits too close to normal room temperature. Minor temperature fluctuations could result in frequent and unnecessary alarm dialouts.

5.4.2 DISABLING ALARM RESPONSE TO HIGH OR LOW TEMPERATURE

To disable alarm response to either high or low temperature settings exclusively, enter the following temperature limit when programming the selected zone. (The Model 400 will not respond to temperatures encountered at maximum settings or beyond.) Begin by following the key sequence shown in Section 5.4.1, and when prompted to enter the high or low temperature value:

- Set high temperature to either +150º F or +65º C (high temperature limit) to prevent the Model 400 from responding to a high temperature alarm.
- Set low temperature to either -20° F or -30° C to prevent the Model 400 from responding to a low temperature alarm.

5.4.3 INTERROGATING HIGH AND LOW TEMPERATURE LIMITS

1. Press WHAT IS.

2. Press TEMP LIMITS.

3. Press the number key corresponding to the selected temperature zone.

5.5 TEMPERATURE SCALE

Temperature zones may be set in either Fahrenheit or Celsius degrees. The default temperature scale is Fahrenheit. To change to Celsius:

1. Press SENSOR ON/OFF.

2. Press °F / °C. The Model 400 responds: “Degrees Celsius” indicating Celsius scale has replaced Fahrenheit scale.

3. To return to Fahrenheit scale, repeat the key sequence. The Model 400 responds: “Degrees Fahrenheit” indicating Fahrenheit scale is in effect.

NOTE: When switching from Fahrenheit to Celsius, or vice versa, the change applies to all zones configured to read temperature. When switching temperature scales it is important to reset high and low temperature limits on all temperature zones. Refer to Section 5.4.1 to reset temperature limits.

5.6 TEMPERATURE CALIBRATION

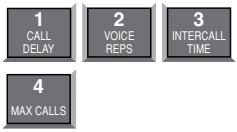
To compensate for minor variances in sensor accuracy, an offset may be programmed for each temperature zone. The amount of offset is measured in degrees Fahrenheit or degrees Celsius. Adjustments are possible within a range from -10 degrees to +10 degrees. For example, if zone 3 is sensing temperature and is reading 1 degree too high, then the calibration for zone 3 is set at -1 to obtain an accurate reading.

5.6.1 PROGRAMMING TEMPERATURE CALIBRATION

1. Press SET.

2. Press CALIBRATE.

3. Press the number (1 to 4) of the selected temperature zone to be calibrated.



4. Enter the number required to offset the current temperature reading so a correct reading is obtained.

- To program a positive offset number (up to +10 degrees), enter the number on the keypad. The Model 400 recites the digits as they are pressed.
- To program a negative offset number (up to –10 degrees), first press *. The unit responds with "negative." Next, enter the number on the keypad. The unit recites the digits as they are pressed.

5. Press ENTER. The Model 400 responds:"Okay."

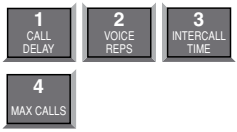
NOTE: If you find that your calibration offset exceeds more than + 5 or –5 degrees, other complicating factors could be affecting normal operation of the Model 400. Call Sensaphone for technical assistance.

5.6.2 INTERROGATING TEMPERATURE CALIBRATION

1. Press WHAT IS.

2. Press CALIBRATE.

3. Press the number key corresponding to the selected temperature zone.



5.7 OBTAINING CURRENT TEMPERATURE

Current temperature readings for each temperature zone may be accessed at any time. The Model 400 recites the zone number, and the actual temperature detected by the attached sensor, for all zones configured as temperature. To obtain current temperature:

1. Press WHAT IS.

2. Press TEST °F/°C.

5.8 AC POWER MONITORING ENABLE/DISABLE

The Model 400 monitors AC power failure. This command enables or disables the power failure detection feature.When enabled, the Model 400 will monitor power and dial out when AC power failure exceeds a programmable span of time (refer to AC Power Failure Recognition Time, Section 5.9).

The default setting for AC power monitoring is enabled (on). When disabled, the Model 400 will not dial-out to report power failure.

5.8.1 ENABLING/DISABLING THE AC POWER ALARM

1. Press SENSOR ON/OFF.

2. Press POWER.

- The Model 400 will say “Power Alarm Disabled” to indicate that the power alarm is disabled, or
- The Model 400 will say “Power Alarm Enabled” to indicate that the power alarm is enabled.

3. Repeat key sequence to change settings.

5.9 AC POWER FAILURE RECOGNITION TIME

The AC Power Failure Recognition Time is the length of time that AC electric power is off before a valid alarm is recognized and dial-out begins. The default setting is 5 minutes, 0 seconds, but is programmable from 0 seconds to a maximum of 540 minutes.

When AC power failure occurs, and throughout the programmed Recognition Time, the Model 400 steadily repeats the message "the power is off" at the unit's installation site. There is no Call Delay programming available for AC power failure. Immediately following Recognition Time, the Model 400 begins the dial-out process to report power failure.

To cancel the power-failure message locally at the keypad (during or after Recognition Time) press the ALARM CANCEL key on the Model 400 keypad. This action also cancels the dial-out process.

5.9.1 PROGRAMMING POWER FAILURE RECOGNITION TIME

1. Press SET.

2. Press RECOGNITION TIME.

3. Press POWER. The Model 400 responds: "Enter minutes."

4. Using the number keys, enter the number of minutes. The Model 400 will recite the digits as they are pressed.

5. Press ENTER. The Model 400 responds: "Enter seconds."

6. Using the number keys, enter the number of seconds. The Model 400 will recite the digits as they are pressed.

7. Press ENTER. The Model 400 responds: "OK."

5.9.2 INTERROGATING POWER FAILURE RECOGNITION TIME

1. Press WHAT IS.

2. Press RECOGNITION TIME.

3. Press POWER.

The Model 400 will recite the power Recognition Time.

5.10 SOUND ALARM MONITORING

This feature allows you to program the level and duration of sound that will cause the Model 400 to respond to an alarm and dial-out. It may be useful to desensitize the Model 400 to sound if it is installed in an area with a relatively high noise level, or where a loud noise occurs frequently but is not associated with an alarm. In some applications, it may be desirable to increase sound sensitivity to low sound levels.

5.10.1 PROGRAMMING SOUND ALARM SENSITIVITY

The sensitivity setting for sound alarm monitoring ranges from 1 to 160. A value of 1 makes the microphone the MOST sensitive to changes in sound. The value 160 makes the microphone the LEAST sensitive to sound. The default value is 32.

1. Press SET.

2. Press CALIBRATE.

3. Press SOUND. The Model 400 responds: "Enter number."

4. Using the number keys, enter a value for sound sensitivity.

The Model 400 recites the digits as you press them.

5. Press ENTER. The Model 400 responds: "Okay."

5.10.2 INTERROGATING SOUND SENSITIVITY

1. Press WHAT IS.

2. Press CALIBRATE.

3. Press SOUND. The Model 400 recites the programmed sound sensitivity level.

5.10.3 PROGRAMMING HIGH SOUND ALARM RECOGNITION TIME

The Recognition Time for sound alarm monitoring ranges from 5 seconds to 60 seconds. The default value is 8 seconds.

1. Press SET.

2. Press RECOGNITION TIME.

3. Press SOUND. The Model 400 responds: “Enter seconds.”

4. Using the number keys, enter the number of seconds. The Model 400 will recite the digits as they are pressed.

5. Press ENTER.

5.10.4 INTERROGATING HIGH SOUND ALARM RECOGNITION TIME

The Recognition Time for sound alarm monitoring ranges from 5 seconds to 60 seconds. The default value is 8 seconds.

1. Press SET.

2. Press RECOGNITION TIME.

3. Press SOUND. The Model 400 responds: "Enter seconds."

5.11 HIGH SOUND ALARM ENABLE/DISABLE

The Model 400 monitors sound through the built-in microphone. When the sound level suddenly exceeds the programmed high sound limit, the Model 400 will respond with an alert condition. The increased sound level must continue throughout the programmed recognition time. The default for high sound alarm is enabled (on).

> **NOTE:** The microphone is also used for listening to on-site sounds. Refer to Chapter 4, Section 4.8. Disabling the sound alarm does not affect listen-in capability.

5.11.1 CHANGING ENABLED/DISABLED HIGH SOUND ALARM

1. Press SENSOR ON/OFF.

2. Press SOUND. The Model 400 will say "Sound Alarm Disabled" to indicate disabled or "Sound Alarm Enabled" to indicate enabled.

3. Repeat key sequence to change settings.

5.12 EXIT DELAY

When tripping an alarm is unavoidable, yet a true alert condition has not actually occurred, the alarm response, including dial-out, can be temporarily suppressed.

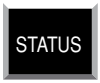
The Model 400 is able to suppress and then reset its dial-out function automatically through use of the Status Report. This is especially convenient when an alert condition is created upon exiting a monitored door, and there is no way to cancel from the local keypad.

> **Example:** You are planning to exit through a monitored door. Prior to exiting, you initiate a Status Report recitation at the Model 400 keypad by pressing WHAT IS, followed by STATUS, (key sequence shown below). This allows you approximately 40 seconds to exit without activating the Model 400's programmed response to an alarm. At the conclusion of the status report, normal alarm response is reactivated.

To use exit delay, initiate the Status Report.

1. Press WHAT IS.

2. Press STATUS. The Model 400 recites the full Status Report; during this time, you are able to exit the monitored area without tripping an alarm.

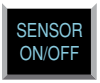


5.13 DESIGNATING A ZONE AS UNUSED

This feature allows you to mark selected Zones, Power, or Sound as unused, which will prohibit them from going into alarm and will also leave them out of the status report. Note that programming for the selected Zone will be preserved when the Zone is marked as "unusued" and will not be reconfigured if automatic Zone configuration is activated.

To designate a Zone as unused:

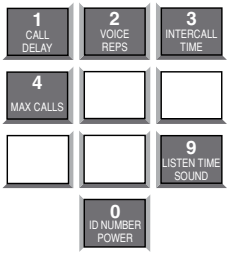
1. Press the SENSOR ON/OFF key.



2. Press the SET key.

The 1400 will say "Enter Zone Number."

3. Press the corresponding number of the Zone you wish to mark as unused.



The 1400 will respond by saying Zone 1–4, Power, or Sound "Off/On." Repeat the key sequence to place the Zone back in use.

CHAPTER 6: ACKNOWLEDGMENT, STATUS REPORT & REMOTE ACCESS

In addition to communication and alarm monitoring capabilities, the Model 400 will also respond to your instructions and provide you with access to information on monitored conditions at all times.

By issuing commands to the unit, either at the installation site or over standard telephone lines, the following features may be activated:

- Acknowledgment of existing alarms
- The Status Report on all monitored conditions.
- Limited programming.

6.1 ALARM ACKNOWLEDGMENT

When the Model 400 dials out with an alarm message, it will request acknowledgment before hanging up. Acknowledgment indicates to the unit that the alarm message has been received. Upon acknowledgment, the Model 400 will cancel the dial-out sequence.

There are three ways* that an alarm is acknowledged directly:

- Local Acknowledgment
- Touch-Tone™ Acknowledgment
- Callback Acknowledgment

* A fourth method of alarm acknowledgment is indirect. Refer to Max Calls, Chapter 4, Section 4.13 for an example of automatic alarm acknowledgment.

6.1.1 LOCAL ACKNOWLEDGMENT

To acknowledge an alarm locally (directly at the installation site of the Model 400), press the ALARM CANCEL Key.

6.1.2 TOUCH-TONE™ ACKNOWLEDGMENT

This method of remote alarm acknowledgment works with a Touch-Tone™ telephone.

> **Example:** You receive a call from the Model 400, reporting that an alarm exists. The message concludes: "*Enter Acknowledgement code*." Now, or at any time during this call, you may acknowledge the alarm with the code "**555**" if you are using a Touch-Tone™ telephone.

- To enter "555," press the number (5) key on the Touch-Tone™ phone keypad three times. The Model 400 will respond: "**Alarm Acknowledged**." The Model 400 will hang up and the dial-out sequence, including any further response to the alarm, will be cancelled.
- If you enter the wrong code or do not enter it within 10 seconds following the conclusion of the message, the Model 400 will respond: "**Error, Enter Acknowledgement code**." If you do not enter the acknowledgement a second time the unit will say "error" then "goodbye" and hang up. The alarm is still not acknowledged until you call back. You have a period equal to the programmed Intercall Time to call the unit back and enter the "555" acknowledgment code. If you are calling from a pulse or rotary telephone, refer to Callback Acknowledgment, Section 6.1.3, below.

6.1.3 CALLBACK ACKNOWLEDGMENT

Callback Acknowledgement is a feature that allows you to acknowledge an alarm without entering Touch-Tones™. This feature is disabled by default and must be enabled by entering the key sequence below. When Callback Acknowledgment is enabled, simply call the unit back and allow the line to ring 10 times. The unit will then answer the call, announce the alarm, then say "Alarm Acknowledged." This indicates that the alarm has been acknowledged.

To enable or disable Callback Acknowledgement:

1. Press SENSOR ON/OFF.

2. Press STATUS.

The Model 400 will say "*Callback Acknowledgement Enabled*" to indicate that Callback Acknowledgment is Enabled, or "*Callback Acknowledgement Disabled*" to indicate that Callback Acknowledgement is Disabled. This method of remote alarm acknowledgment works with any telephone: pulse, rotary, or Touch-Tone™.

Example: The Model 400 calls you with an alarm message. You answer the call with a rotary or pulse telephone, and do the following:

- You listen to the message and hang up.
- Then you call the Model 400 back on any telephone. You must wait for 10 rings—this signals the Model 400 to answer your telephone call. (Make

sure to call back within the programmed setting for Intercall Time—refer to Chapter 4, Section 4.12.)

When the Model 400 answers your return call, it announces the alarm. Then it says: "*Alarm Acknowledged*." This indicates that the alarm has been acknowledged.

> **NOTE:** If you have the TAD feature (telephone answering device) enabled, call the unit and let the phone ring once, then hang up. Wait a few seconds then call the unit back a second time. The model 400 will now answer on the first ring. If TAD is disabled, the telephone must be allowed to ring 10 times. This serves as a precaution against a random alarm acknowledgment. Refer to Chapter 4, Section 4.7, for complete information on using the TAD feature.

6.2 STATUS REPORT

The Status Report allows access to complete information on all monitored conditions either locally, from the keypad, or by telephone, from any location. The Model 400 will answer an incoming telephone call following the programmed Rings Until Answer (refer to Chapter 4, Section 4.6). Included with the Status Report are messages related to alarm conditions, AC power, battery backup and sound level. It also provides an opportunity for listening to on-site sounds (refer to Listen-in Time, Chapter 4, Section 4.8).

To initiate the Status Report:

1. Press WHAT IS.

2. Press STATUS.

Sections 6.2.1, 6.2.2, and 6.2.3 demonstrate two different Status Report recitations. The Status Report starts with:

"Hello. This is 555-1234 (or the programmed ID), (Custom ID Message)."

"It is now 12:15pm (or the current time)."

The Model 400 proceeds with a separate report for each zone. Each zone identifies itself by reciting the zone number and it's associated voice message.

6.2.1 EXAMPLE: STATUS REPORT, NO ALARMS

Zones 2, 3, and 4 are configured as dry contact and zone 1 is configured as temperature. No alarms exist. The Status Report begins by saying, "*Hello, this is 555-1234, this is building M, third floor; it is now 2:30 pm.*"

Following this introduction, the report continues:

"Zone 1, room temperature, 74 degrees, OK."

"Zone 2, door alarm, OK."

"Zone 3, ups alarm, OK."

"Zone 4, water sensor, OK."

"The sound is OK."

"The power is ON." This refers to AC power.

"The batteries are OK." Other possible responses: *"Batteries are low"* or *"Replace batteries."* (Refer to Section 6.2.4 for additional information regarding battery condition.)

"The output is off."

"Listen to the sound for 10 seconds." In this case, the programmed Listen-in Time is set at 10 seconds. (This feature is not available when obtaining the Status Report on-site, directly at the keypad.)

The Status Report repeats once more and the Model 400 concludes the call, saying: *"Goodbye."* (The Status Report will not repeat if obtained at the keypad; *"Goodbye,"* is also not recited.)

The phrase *"no number"* at the end of a Status Report indicates that no dial-out phone numbers have been programmed.

6.2.2 EXAMPLE: STATUS REPORT, EXISTING ALARMS

Zones 2, 3, and 4 are configured as dry contact and zone 1 is configured as temperature. An emergency situation is at hand: a fire in a greenhouse has tripped a smoke alarm and electrical power has been disrupted. In addition to high sound and AC power alarms, separate alarms exist on zones 1, 2, 3, and 4. You happen to call in for the Status Report, which begins with, "*Hello, this is 555-1234; "this is the Sensaphone 400 at ACME Greenhouse, 225 Oak Street"*

It is now 8:45 PM

Zone 1, "Temperature in greenhouse", 110 degrees Fahrenheit, too high, acknowledged alarm exists

Zone 2, "Door alarm in greenhouse", not OK, acknowledged alarm exists

Zone 3 "Water pressure alarm in greenhouse", not OK, acknowledged alarm exists

Zone 4 "Greenhouse control system", not OK, acknowledged alarm exists

A High Sound alarm exists, it is now too high

The Power is Off.

The Batteries are Low.

The Output is Off.

Listen to the sound for 10 seconds.

Goodbye.

6.2.3 EXAMPLE: STATUS REPORT, DISABLED ZONES

If a zone is disabled, the dial-out feature for that zone is deactivated, but all other programmed parameters remain in effect. In the example below, all 4 zones are disabled, although zones 1 and 3 are detecting alarms. AC power and Sound Level are also disabled for dial-out. When you call the Model 400 for a Status Report, you hear the following:

Hello, this is 555-1234; "this is the Sensaphone 400 at ACME Greenhouse, 225 Oak Street"

It is now 8:45 PM

Zone 1, "Temperature in greenhouse", the alarm is disabled, it is now 110 degrees Fahrenheit, too high, acknowledged alarm exists

Zone 2, "Door alarm in greenhouse", the alarm is disabled, it is not OK.

Zone 3 "Water pressure alarm in greenhouse", the alarm is disabled, it is not OK.

Zone 4 "Greenhouse control system", the alarm is disabled, it is not OK.

The Sound alarm is disabled, it is now too high

The Power alarm is disabled, it is now Off.

The Batteries are Low.

The Output is On.

Listen to the sound for 10 seconds.

Goodbye.

The Status Report repeats once more and the Model 400 concludes the call, saying: *"Goodbye."*

6.2.4 BATTERY CONDITION

During a Status Report, you may hear one of three possible messages regarding battery power. The Model 400 determines the appropriate message by measuring battery voltage. Depending upon the remaining voltage, it may respond:

- *"The batteries are OK,"* if over 8.2 Volts.
- "*The batteries are low,*" if between 7.2 and 8.2 Volts.
- *"Replace batteries,"* if below 7.2 Volts.

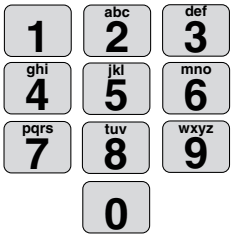
6.2.5 REMOTE ACCESS BY TOUCH-TONE™ TELEPHONE

You can issue a number of commands to the 400 remotely using a Touch-Tone™ telephone. This command mode can be entered at any time during the status report. Simply press a Touch-Tone™ and the unit will halt the report and respond with "OK." You are now in Touch-Tone™ command mode. Commands are available to perform the following functions:

- Enable and disable zones, power monitoring, and sound monitoring
- Recite/Set High and Low alarm limits
- Recite/Set telephone numbers
- Record/Play custom voice messages
- Recite/Set the relay output
- Activate the microphone for listen-in
- Recite status report

Note: If a security code is enabled, the 400 will prompt you with "Enter security code." Enter the four-digit keypad security code plus "#" to enter touch-tone command mode. If entered correctly, the 400 will respond with "OK" and you can proceed to enter the commands. If entered incorrectly, the unit will give you one more chance. If it is incorrect a second time, the unit will say "Error, goodbye" and hang up.

The commands are put together based on the letters of a touch-tone telephone. See typical telephone keypad layout below.



Many of the commands use three letters that represent an abbreviation of the selected command. For example, to Set a High limit on Zone 1 you would press S + H + 1 (or in numeric form 7 + 4 + 1)

The tables below list all of the touch-tone commands that are supported. Commands are listed in both character and numeric formats. The # key is used as an ENTER key. Use the * key to represent a negative sign or to represent the [CODE] key when programming telephone numbers.

Enable/Disable Zones

This command will toggle the selected zone between the enabled or disabled state.

Description	Touch-Tone Command
Enable/Disable Zone	* + Z(9) + (zone number)

Set and Recite High & Low Alarm Limits

The following commands are used to set or recite the Low Alarm Limit for any Zone.

Description	Touch-Tone Command
Set Zone Low Limit	S(7) + L(5) + (zone #) + (value) + #
Description	Touch-Tone Command
What Is Zone Low Limit	W(9) + L(5) + (zone #)

The following commands are used to set or recite the High Alarm Limit for any Zone.

Description	Touch-Tone Command
Set Zone High Limit	S(7) + H(4) + (zone #) + (value)+ #
Description	Touch-Tone Command
What Is Zone High Limit	W(9) + H(4) + (zone #)

Set and Recite Telephone Numbers

The following commands will allow you to program and recite dialout telephone numbers. You may need to use the Special Dialing Codes below.

Special Dialing Codes Summary

Code 1: Numeric pager type

Code 2: Wait for answer

Code 3: Change to Touch-Tone

Code 4: Pause

Code 5: Star (*)

Code 6: Pound (#)

Description	Touch-Tone Command
Setting a phone number	S(7) + T(8) + (entry 1–4) + (telephone number) + #

Description	Touch-Tone Command
Reciting a phone number	W(9) + T(8) + (entry 1–4)

Record and Play Custom Voice Messages

The following commands will allow you to record and play back custom voice messages for the ID message (0) and each zone (1–4).

Description	Touch-Tone Command
Record a Message	S(7) + M(6) + (entry 0–4)

Description	Touch-Tone Command
Play a Message	W(9) + M(6) + (entry 0–4)

Control the Relay Output

The following commands will allow you to check the status of the relay output and to toggle the Relay Output On and Off.

Description	Touch-Tone Command
Reciting the Output Status	W(9) + R(7) + O(6)

Description	Touch-Tone Command
Switching the Output	S(7) + R(7) + O(6)

Activate Microphone Listen-in

The following command will allow you to activate the microphone listen-in for the programmed duration.

Description	Touch-Tone Command
Activate Mic Listen-in	M(6) + I(4) + C(2)

Request Status Report

The following command will initiate a status report.

Description	Touch-Tone Command
Recite status report	W(9) + S(7) + R(7)

Hang-up

The following command will make the 400 hang up the telephone line.

Description	Touch-Tone Command
Hang-up the phone line	B(2) + Y(9) + E(3)

CHAPTER 7: OPERATION

After installation and programming is completed, the Model 400 is fully operational. This chapter explains the sequence of events that occur during an alarm dialout to illustrate how the Model 400 operates.

7.1 ALARM DETECTION, DIAL-OUT AND ACKNOWLEDGMENT

Generally, an alarm event is structured in the following manner:

I. The Model 400 detects an alert condition due to a change at the sensor.

II. A valid alarm is recognized.

III. Dial-out begins.

IV. The alarm is acknowledged.

Often, an alarm does not proceed through all stages: either an alert condition does not persist long enough to be considered valid, or a valid alarm is cancelled.

The table on the following pages explains the alarm detection, dial-out and acknowledgment features and lists important variable factors affecting their operation.

I. Model 400 Detects a Change at the Sensor	Variable Factors
Model 400 detects a change in the monitored condition (from the sensor wired to one of the zones). This is considered an alert condition, and does not qualify as a valid alarm at this point. The condition continues throughout the programmed Recognition Time. If the condition (or sensor) reverts to its normal state before the Recognition Time is reached, no alarm will occur.	*Zone Type: (1) An open circuit closes, (2) a closed circuit opens, or (3) temperature limits are exceeded.* *Recognition Time: Activated*
II. A Valid Alarm is Recognized	**Variable Factors**
The condition must persist long enough to meet or exceed the programmed Recognition Time. When Recognition Time has expired, but the alert condition continues, the Model 400 will determine that a valid alarm exists. When a valid alarm is determined, Call Delay is activated, forcing the Model 400 to wait for a programmed period of time before starting the dial-out process. Call Delay applies to the period just prior to dial-out, before the first telephone call is made. Call Delay provides the opportunity to cancel a valid alarm at the Model 400's installation site, before dial-out occurs. An audible voice message indicates which of the zones is in alarm. If on-site personnel acknowledge the alarm within the Call Delay time, the Model 400 will not dial out. (Local Voice Mute is disabled, so that alarm messages can be heard at the site.)	*Recognition Time: Expired* *Valid Alarm: Exists* *Call Delay: Activated* *Alarm Message: Audible, On-site Activated* *Local Voice Mute: Disabled*

III. Dial Out Begins	**Variable Factors**
The dial-out process is activated as soon as the Call Delay time expires (if the alarm has not been cancelled at the Model 400's installation site.) The dial-out begins with telephone number 1 and proceeds sequentially, through the remaining telephone numbers.	*Call Delay: Expired*
If the alarm is not acknowledged with the first dial-out telephone call, the Model 400 waits the duration of Intercall Time before dialing the next telephone number. Intercall Time is the programmed waiting period in between each dial-out telephone call.	*Intercall Time: Activated*
When the telephone is answered, the programmed Voice Repetitions determine the number of times per call the Model 400 recites the alarm message.	*Voice Repetitions: Activated*
Call Progress, an automatic feature, enables the Model 400 to detect whether or not the telephone call is answered. After 10 rings, or if a busy signal is encountered, the Model 400 will hang up, wait the programmed Intercall Time, and proceed to dial the next telephone number.	*Call Progress: Activated*
If no telephone calls are answered, the Model 400 dials out sequentially, through the remaining telephone numbers and continues to cycle until the programmed Maximum Number of Calls is reached.	*Max Calls: Activated*
When the telephone is answered, the Model 400 will immediately begin reciting a message that indicates which of the zones is in alarm. At the same time, the alarm message is repeating at the Model 400's installation site. The Model 400 will request acknowledgment, if it has not yet occurred.	*Alarm Messages: By Telephone and On site*

IV. The Alarm Is Acknowledged	Variable Factors
At any time after a valid alarm is determined, the alarm may be acknowledged at the Model 400's installation site, by pressing ALARM CANCEL key.	*Local, On-site Acknowledgment*
When the Model 400 dials out and the call is answered via Touch-Tone telephone, any alarm may be instantly acknowledged by pressing "555."	
If the alarm message repeats for the number of programmed Voice Repetitions, and "555" has not been entered, the Model 400 will say:	*Touch-Tone Acknowledgment: Fast Code 555*
"Enter acknowledgement code."	
The Model 400 waits 10 seconds for the Touch-Tone code "555" to be entered. If the code is entered within 10 seconds, it responds:	
"Alarm acknowledged."	*Touch-Tone Acknowledgment: Normal Code 555*
The alarm is considered acknowledged and the dialout concludes.	
If the Model 400 does not receive the Touch-Tone code within 10 seconds, it recites the following:	
"Error, enter acknowledgement code."	*Tone or Pulse Callback Acknowledgment: Within Intercall Time*
If the Model 400 does not receive the acknowledgement code a second time, it says "error, goodbye" and hangs up. The recipient of this message must call the Model 400 back within the period programmed for Intercall Time, in order to acknowledge the alarm. If Local Voice Mute is off, the unit will beep at the installation site while waiting for this call.	
Callback Acknowledgement: If enabled, the Model 400 waits 10 rings before answering to guard against random acknowledgment. If an answering device is connected to the same line as the Model 400 (and TAD is enabled), you must call the unit and let the line ring once, then hang up, wait ten seconds and call back again within 30 seconds. The Model 400 will answer on the first ring. It will recite any unacknowledged alarms, then say:	
"Alarm acknowledged, goodbye."	

	Variable Factors
When the Model 400 hangs up, the alarm is acknowledged and dial-out stops. If calls remain unanswered, or if they are received by an answering machine or FAX, the Model 400 continues the dialout sequence; it waits the Intercall Time and proceeds to dial the next telephone number. Telephone numbers are dialed sequentially, and this cycle continues for the number of Max Calls programmed. If no acknowledgment occurs, then at the completion of Max Calls, the alarm is automatically acknowledged and the dial-out process is terminated.	*Tone or Pulse* *Callback Acknowledgment: TAD Enabled* *Max Calls Acknowledgment*

NOTE: Acknowledging the alarm does not correct the situation! The alarm condition will still exist until the sensor is restored to its normal state.

7.2 EXAMPLE: A DIAL-OUT TELEPHONE CALL

The following parameters are selected for demonstration purposes:

- Model 400 Unit ID Number is set to 555-5674. It is currently installed at your place of business.
- Dial-out Telephone Number 1 is programmed to 555-1234, your home telephone number.
- Voice Repetitions are set to 4.

The Model 400 is detecting an alarm on zone 2.

The telephone rings at 555-1234, your home number.

You answer the telephone and hear the following message:

"Hello, this is 555-5674. This is the Sensaphone 400 at John's Printing Express. It is now 12:30 Am. Zone two, back door security sensor, alarm exists, it is not okay."

(4-seconds to hear on-site sound from unit's microphone.)

"Hello, this is 555-5674. This is the Sensaphone 400 at John's Printing Express. It is now 12:30 Am. Zone two, back door security sensor, alarm exists, it is not okay."

(4-seconds to hear on-site sound from unit's microphone.)

"Hello, this is 555-5674. This is the Sensaphone 400 at John's Printing Express. It is now 12:30 Am. Zone two, back door security sensor, alarm exists, it is not okay."

(4-seconds to hear on-site sound from unit's microphone.)

"Hello, this is 555-5674. This is the Sensaphone 400 at John's Printing Express. It is now 12:30 Am. Zone two, back door security sensor, alarm exists, it is not okay."

(4-seconds to hear on-site sound from unit's microphone.)

"Enter acknowledgement code."

NOTE: It is important that your dial-out telephone numbers be answered by you or other authorized personnel in order to ensure adequate response to an alarm.

CHAPTER 8: CONTROLLING THE OUTPUT

The Sensaphone 400 includes a relay output that can be used to control a light, siren, or other device. The output is a Form-C Normally Open/ Normally Closed mechanical relay and is rated for up to 30VAC/VDC 1A. A sample wiring diagram is shown below:

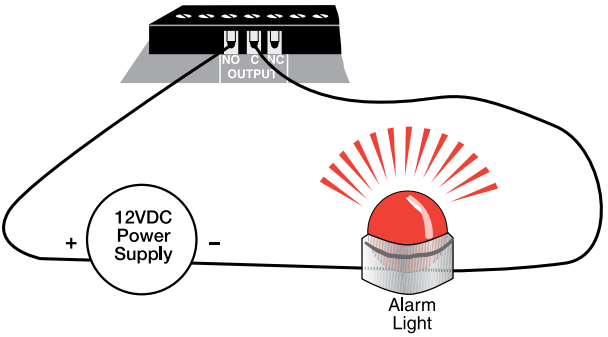


Figure 1: Relay output connected to alarm

The output can be programmed to operate in one of 9 automatic modes or it can operate in manual mode (default). The 9 automatic modes allow the output to automatically turn on and off based on individual alarms or any alarm. In manual mode the output is controlled via keypad command or remotely via touch-tone phone. A description of each mode is described below.

8.1 OUTPUT MODES

Mode	Description
1	Output on when zone 1 goes into alarm. Off when alarm is acknowledged.
2	Output on when zone 2 goes into alarm. Off when alarm is acknowledged
3	Output on when zone 3 goes into alarm. Off when alarm is acknowledged.
4	Output on when zone 4 goes into alarm. Off when alarm is acknowledged.
9	Output on when a Sound alarm occurs. Off when alarm is acknowledged.
0	Output on when a Power alarm occurs. Off when alarm is acknowledged.

Mode	Description
Phone	Output on when phone line is unplugged for more than 15 seconds. Off when a phone line is plugged in.
•	Output on when any alarm occurs. Off when all alarms are acknowledged.
#	Output controlled manually via keypad command or touch-tone.

8.1.1 TO PROGRAM THE OUTPUT MODE:

1. Press the SET key.

2. Press the OUTPUT key.

The 400 will say "Enter output mode."

3. Using the number keys, enter a value for the output mode.

4. Press the ENTER key.

The 400 will say "OK" and recite a description of the mode selected, such as "Automatic on Zone 1" or "Manual." Note that when Mode * is selected, the 400 will simply say "Automatic on Alarm," meaning that the output will automatically turn on when any alarm occurs.

8.1.2 TO PLAY BACK THE PROGRAMMED OUTPUT MODE:

1. Press WHAT IS.

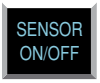
2. Press OUTPUT.

The 400 will recite the programmed output mode.

8.2 SWITCHING THE OUTPUT USING THE KEYPAD

When programmed for Manual mode, the command to switch the output is:

SENSOR ON/OFF + OUTPUT.



The 400 will respond "The output is on/off" to indicate the state of the output.

> **Note:** If the 400 says "Error," the output is not programmed for manual mode.

8.2.1 SWITCHING THE OUTPUT OVER THE PHONE

The following commands will allow you to check the status of the relay output and to toggle the Relay Output On and Off.

To recite the Output Status press W(9) + R(7) + O(6)

To switch the Output press S(7) + R(7) + O(6)

8.3 TYPICAL APPLICATIONS

Heating Up Your Cottage Or Cabin Remotely

If you keep your cottage or cabin open all year around, or if you do not drain your pipes and add antifreeze to your plumbing, you likely keep your furnace active when you are away but at a very low temperature. The Sensaphone will provide an invaluable service to you by keeping you updated to any change in the status of your furnace operation. Prior to your arrival at your cottage or cabin, you can remotely use your Sensaphone 400 to raise the thermostat and increase the heat.

Most furnaces use a typical 4-wire (heat/cooling) or 3-wire (heat only) thermostat. The Sensaphone can easily control these types of thermostats. **If your heating source consists of high voltage electric baseboard heaters, you should consult a qualified electrician or heating professional for proper installation of the Sensaphone remote control facility**. Electric baseboard heaters may utilize either a low voltage (2-wire) thermostat or a direct control high voltage thermostat. Only the low voltage thermostat may be directly connected to the Sensaphone.

8.3.1 SINGLE THERMOSTAT CONTROL

There are two installation methods that can be used to remotely change the thermostat setting in your cottage or cabin; the single thermostat method and the dual thermostat method (see section 8.3.2 for details on the dual thermostat method). The single thermostat method requires you to install a model with an input to switch between two temperature settings. Sensaphone offers a 7-day programmable thermostat and power supply which has this feature (order part #'s FGD-0064 & XFR-0024). This thermostat has been carefully chosen to work with the model 400 to allow remote control between normal or vacation mode. You will need to replace your current thermostat, so if you are unsure about performing this work yourself, please contact a licensed heating/cooling professional for installation assistance. Follow the manufacturer's instructions for installing the thermostat.

The Model 400 will need to be wired to the thermostat to control it. For a visually appealing installation you may want to locate the Sensaphone close to your heater so that the cable follows the same path as the one from your heater to the thermostat. An added benefit of this location is that you can easily add a water sensor to monitor for leaks around your hot water heater or other plumbing. Typically the water heater is located near the heating and cooling system.

Step 1: Install the thermostat.

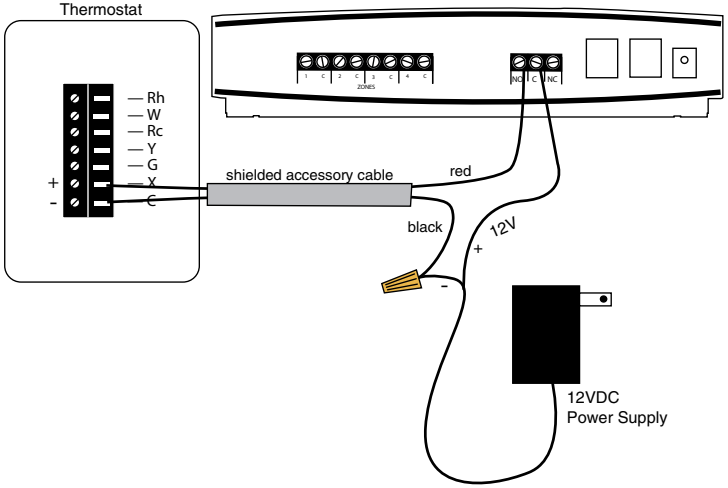
Refer to the manufacturer's instructions for installation. For installation assistance, contact Aube Technologies at 1-800-831-AUBE.

Step 2: Mount the Sensaphone 400.

Choose a location for your Sensaphone that allows for easy wiring to the thermostat, such as near your heater/air conditioning system. Mount the unit on a wall or flat on a desktop or table surface. Plug in the power supply and connect the telephone line.

Step 3: Connect cable from thermostat to Sensaphone 400.

This Sensaphone 400 has a terminal strip below the input/output wiring door that will connect to the 12VDC power supply and X & C terminals of the thermostat (See Figure 1). This connection is required to switch the thermostat between normal and vacation modes. Run a two-conductor cable from the thermostat to the Model 400. On the thermostat, connect the red wire to the X (+) terminal, and the black wire to the C (-) terminal. On the 400, connect the red wire to the NO terminal. Connect the black wire to the negative wire from the power supply. Use a wire nut to complete this connection. Connect the positive wire from the power supply to the "C" terminal on the model 400.



Step 4: Program the Thermostat.

Refer to the manufacturers instructions for programming the thermostat. Be sure to program settings for both normal and vacation modes.

Controlling the Thermostat

The operating mode of the thermostat (normal/vacation) can be controlled at the Model 400 keypad or remotely via Touch-Tone comands. Both methods are described below:

Keypad commands:

1) To enable Vacation Mode, press the [SENSOR ON/OFF] key, then the [OUTPUT] key. The unit will respond by saying "ON" to indicate that Vacation Mode is set. The Suitcase icon  will appear and blink on the thermostat LCD.

2) To enable Normal Mode, press the [SENSOR ON/OFF] key, then the [OUTPUT] key. The unit will respond by saying "OFF" to indicate that Normal Mode is set. The Sun  or Moon  icon will appear on the thermostat LCD.

TouchTone Commands:

Call the Sensaphone. When the unit answers, it will begin reciting a status report. At any time during the call, press a Touch-Tone. The unit will respond with "OK." The Sensaphone is now ready to accept Touch-Tone commands.

1) To enable Vacation Mode, press SRO (776). The unit will respond by saying "ON" to indicate that Vacation Mode is set. The Suitcase icon  will appear and blink on the thermostat LCD.

2) To enable Normal Mode, press SRO (776). The unit will respond by saying "OFF" to indicate that Normal Mode is set. The Sun  or Moon  icon will appear on the thermostat LCD.

3) To check the status of the ouput press WRO (976). The unit will respond "OFF" for Normal Mode or "ON" for Vacation Mode.

4) Hang up.

8.3.2 DUAL THERMOSTAT CONTROL

When a three or four wire low voltage thermostat is used, it is easy to connect the Sensaphone to your furnace with the addition of a secondary thermostat. One thermostat is set to your preferred "away" temperature and the other thermostat is set to your preferred "home" temperature. With your Sensaphone 400, you will be able to switch between these two thermostats using the relay output.

Ideally, the "away" thermostat would be in your pump or furnace room. Remember that your "away" thermostat will be the only thermostat that keeps your cottage or cabin at minimal heat while you are away. It should

not be located near a window or where direct sunlight might warm it, near a furnace radiator or vent, or any heat source such as a pilot light.

The second thermostat, the one pre-set for your preferred temperature when you arrive at your cottage or cabin, should be located in your normal living space. This would likely be your existing thermostat, already located in a suitable location by your heating professional at the time your furnace was installed.

By connecting these two thermostats together in a parallel fashion, and by passing the low voltage supply through the Sensaphone (See Figure 1), you can remotely or locally decide which thermostat is in control of your furnace.

It is recommended that the "away" thermostat be connected to the NC (Normally Closed) terminal while the "home" thermostat be connected to the N0 (Normally Open) terminal of the Sensaphone. This way, it's easy to understand which state your furnace is in: Output ON = Home and Output OFF = Away. The supply voltage from your furnace (typically the wire labeled R or 24VAC), should always be connected to the C (Common) terminal on the 400.

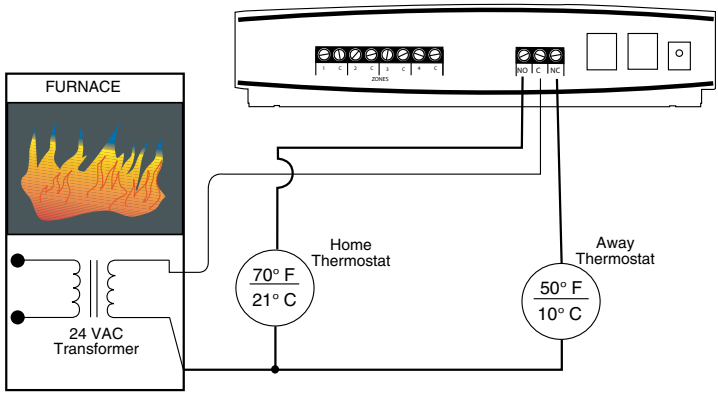


Figure 1: Dual Thermostat Setup

Note: This is a typical configuration when using standard single-zone heat/cool thermostats. For ease-of-use it is recommended that both thermostats be the same model. Note also that all thermostats may not be compatible with the dual-thermostat wiring diagram. Consult your heating/cooling professional for installation assistance.

8.3.3 CONTROLLING LIGHTS OR OTHER DEVICES

Using X10 technology, you can remotely activate any electrical device or appliance in your home through your Sensaphone. X10 technology is a suite of control modules that plug into your existing electrical outlets and transmit coded signals to lamps, lights, and appliances to turn them on or off (See Figure 2).

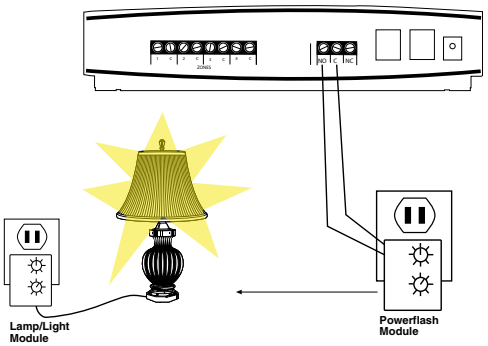


Figure 2: X10 Lighting Control Setup

Sensaphone supports these devices through use of the popular X10 Powerflash relay interface. To learn more about this technology, consult X10 products on the web at www.x10.com or visit your local electronics shop such as Radio Shack.

Such applications may include turning on a lamp or exterior lights remotely from your cellular telephone when arriving at your residence late at night. Or you can use the X10 Powerflash Module (set to momentary contact) in conjunction with the X10 Universal Module to remotely control your electric garage door opener over the telephone—an ideal way of letting in your service personnel without being on-site. You may also use the X10 technology to send the ON/OFF signal to a furnace or heater if your thermostat is not easy to wire directly.

Finally, in addition to remotely controlling devices, X10 technology lets you extend the reach of certain Sensaphone sensors such as door contacts, motion sensors, or water sensors. This is of great benefit where it is impossible to wire directly from your sensors to your Sensaphone. Consult a qualified electrician or your heating professional for assistance with locating your remote sensors or contact your Sensaphone dealer.

APPENDIX A: WEEKLY TESTING PROCEDURE

We recommend that you test your Sensaphone weekly to be sure it is functioning properly. This will ensure that when a problem arises the Sensaphone will be ready to alert the appropriate personnel.

There are several tests that can be performed:

1) Call the unit and listen to the Status Report. This will test the unit's ability to answer the phone and speak a message. It will also verify that all of the zones are reading properly, the alarm conditions are OK, the electricity is on, the microphone is functioning, and the batteries are OK.

2) Create an alarm on each zone by tripping all connected sensors.
   Temperature sensors: Heat or cool the sensor.

   Motion sensors: Have someone walk in front of the sensor.

   Door/window sensors: open the door/window.

Water sensors: Apply a small amount of water beneath the sensor or use a wet towel and touch it to the sensor probes.

Humidity sensors: Raise the humidity around the sensor by holding a cup of very hot water beneath the sensor.

Allow the unit to contact all programmed telephone numbers. This will make sure that the Sensaphone is programmed properly. It will also prepare personnel to respond appropriately when they receive a call from the Sensaphone.

3) Test the batteries by unplugging the AC adapter and making sure that the Sensaphone continues to function. Press WHAT IS, then STATUS on the keypad, and listen to the status report. Make sure the report states that "the power is off" and "batteries are OK." Keep the AC adapter unplugged so that a Power Failure alarm occurs. Allow the unit to dial all programmed telephone numbers while running on battery backup. Plug in the AC adapter after the unit has finished dialing all of the telephone numbers.

4) If you are using your Sensaphone to listen for a smoke alarm, then be sure to test the smoke alarm to make sure that the Sensaphone picks up the audible signal and triggers a high-sound-level alarm. Allow the unit to dial all programmed telephone numbers.

5) Keep a log of your tests, noting the date and whether the 400 passed in each category tested. An example of such a log is shown below. (See "Test Log" at the end of this manual.)

400 Test Log

Date	Inputs		Dialout		Call-in		Tested by
	Pass	Fail	Pass	Fail	Pass	Fail	
7/1/04	X		X		X		Bob H
7/15/04	X		X		X		Alex G.
7/22/04	X		X		X		Bob H.

If you require assistance, call Sensaphone Technical Support at 610-558-2700.

APPENDIX B: TROUBLESHOOTING

In the event that a problem is encountered, this section will assist you in determining the cause, so you can return the unit to its usual monitoring routine with minimal interruption.

Most problems with the Model 400 are easy to identify and quickly corrected, and are found under the following general headings:

- Error Messages
- Communications/dial-out functions
- Temperature monitoring
- Sound level monitoring
- Other monitoring functions

If you have tried the solutions outlined in this section and are not satisfied with the results, call Sensaphone Technical Support at 610-558-2700, or follow the guidelines for shipping the Model 400 to Sensaphone for repair (see Appendix F).

ERROR MESSAGES

Problem	Cause	Solution
The unit says "Error 1."	An invalid value has been entered or too much time has passed without entering a value.	Only enter values within the allowed programming range, and make programming changes in a timely fashion.
The unit says "Error 2."	Programming changes were attempted without unlocking the keypad.	Unlock the keypad, then make programming changes.

COMMUNICATIONS / DIAL OUT

Problem	Cause	Solution
1)The Model 400 fails to dial out.	a) The telephone number may be incorrectly programmed.	Recheck programming steps. Refer to Chapter 4, Section 4.2.1.
	b) Tone or pulse (the current dialing method) is not compatible with the telephone line on which the Model 400 is installed.	Switch from the current setting: from tone to pulse, or from pulse to tone. Refer to Chapter 4, Section 4.3.
	c) Recognition Time is too long. An alert condition does not remain in effect long enough to become a valid alarm.	Reprogram Recognition Time. Set the Recognition Time to the minimum duration required to create a valid alarm. If possible, test the new setting by deliberately creating an alert condition. Refer to Chapter 5, Section 5.3.
	d) The Model 400 is connected to an incompatible telephone line.	The Model 400 must be connected to a standard (2-wire analog) telephone line, not a digital extension to a phone system. If the unit will not dial out and the factors previously listed have been ruled out, try connecting the unit to a standard residential telephone line.

Problem	Cause	Solution
2. The Model 400 will not answer the telephone when called for a Status Report or alarm acknowledgment.	a) Rings Until Answer is incorrectly programmed.	Recheck programming of Rings Until Answer. Refer to Chapter 4, Section 4.5.1.
	b) The Model 400 is connected to an incompatible telephone line.	Some telephone systems will not allow the telephone to ring beyond 4 rings. If your Model 400's Rings Until Answer is set at more than 4 rings, you may not be able to access the unit. Try setting the Rings Until Answer to less than 4 rings. If this does not correct the problem, it may indicate telephone line incompatibility. In this case, try connecting the Model 400 to a standard, residential telephone line.
3. The Model 400 will not answer the telephone for Callback Acknowledgement.	You did not allow the telephone to ring 10 times. Note: If the TAD (telephone answering device) is disabled, the telephone rings ten times before the Model 400 answers. If the TAD is enabled, you must call the unit and let the line ring once, then hang up, wait ten seconds and call back again within 30 seconds.	When calling the Model 400, and the TAD is disabled, allow the telephone to ring 10 times. Refer to Chapter 6, Section 6.1.3, and Chapter 4, Section 4.6.3.
4. The Model 400 recites the alarm message or Status Report over the telephone, but is silent at the installation site.	The local voice mute feature is in effect.	Deactivate local voice mute. Refer to the programming steps in Chapter 4, Section 4.9.
5. The Model 400 and telephone answering device (sharing the same line) answer incoming calls simultaneously.	The Model 400's number of Rings Until Answer is set to equal the number of rings set for the telephone answering device.	Change the number of Rings Until Answer for the Model 400. Refer to Chapter 4, Section 4.5.

TEMPERATURE MONITORING

Problem	Cause	Solution
1. Can't program temperature limits; or the unit won't read the temperature sensor.	The zone isn't configured to read a temperature sensor.	Press SET and CONFIGURE to program the zone. (See Section 5.1.1 for more information on configuring zones.)
2. The temperature reading is -20° F or -30° C.	The temperature sensor has been disconnected or has broken wires.	Examine the wires to temperature sensor and connect or replace wiring.
3. Temperature reads 150° F or 65° C.	Temperature sensor wires are touching or have shorted.	Verify and correct wiring.
4. Temperature reading is inaccurate.	a) Temperature sensing may be affected by a source of ambient heat (ie., direct sunlight, or heat duct proximity). b) Temperature may require calibration. c) The unit is using the wrong temperature scale (Fahrenheit vs. Celsius).	Try moving the unit to a different location. After moving or placing the unit away from ambient heat sources, the temperature may be calibrated to offset inaccurate normal reading by several degrees. Refer to Chapter 5, Section 5.6. Verify temperature scale. Refer to Chapter 5, Section 5.5.
5. False high temperature alarms from freezer.	Most freezers have a defrost cycle during which the temperature will rise considerably, thus causing an alarm to occur.	Program an zone recognition time longer than the defrost cycle.
6. The Sensaphone calls with a high/low temperature alarm but recites a temperature that's within the programmed limits.	The Sensaphone recites the "current" temperature when it calls you, not the temperature at the time the alarm occurred. It is likely that the temperature has changed since the time the alarm was detected and has since returned to normal operating conditions.	Shorten the Call Delay or lengthen the Zone Recognition Time.

SOUND LEVEL MONITORING

Problem	Cause	Solution
1. False high sound alarms occur frequently.	The programmed sound sensitivity results in over-sensitivity to non-alarm sound as well as alarm sound. Sound Recognition Time is too short.	Reprogram the sound sensitivity. Refer to Chapter 5, Section 5.10. Lengthen the sound Recognition Time. Refer to Chapter 5, Section 5.10.
2. High sound does not cause an alarm.	The unit is not close enough to the high sound source, or the programmed sound setting results in a lack of sensitivity to high sound.	Move the unit closer or reprogram the sound sensitivity. Refer to Chapter 5, Section 5.10.

OTHER MONITORING

Problem	Cause	Solution
1. Alarm status of an alert zone is incorrect.	Incorrect zone normality.	Reconfigure the zone. Refer to Chapter 5, Section 5.1.
2. False power out alarms	Programmed Recognition Time is too short.	AC power is often subject to brief interruptions. To avoid frequent, false alarms, increase the power Recognition Time. Refer to Chapter 5, Section 5.9.
3. The Model 400 does not recognize power failure.	a) Batteries are either incorrectly installed or drained.	To verify proper battery function, unplug the unit and verify continued operation using batteries only. If unit ceases to function, first try reinstalling the batteries. If this is not successful, replace the batteries. Refer to Chapter 2, Section 2.4 for complete instructions.
	b) Recognition time setting is too long.	Reprogram Recognition Time. Set the Recognition Time to the minimum required before a valid alarm occurs. If possible, test the condition by deliberately creating an alert condition. Refer to Chapter 5, Section 5.9.

4. The Model 400 does not recognize any alarm.	a) Zones for alarm are disabled.	Enable the zones for alarm. Refer to Chapter 5, Section 5.2.
	b) Programmed Recognition Time is too long.	Reprogram Recognition Time. Set the Recognition Time to the minimum required for a monitored condition to become a valid alarm. If possible, test the condition by deliberately creating an alert condition. Refer to Chapter 5, Section 5.3.
5. The batteries drain prematurely.	The unit's AC transformer is unplugged or for some other reason, full AC power is not available to the unit.	The batteries will take over powering the unit when the AC transformer is unplugged from the 120 VAC outlet. When storing the unit, be sure to remove the batteries. Refer to Chapter 2, Section 2.4. *Be sure to use alkaline batteries—do not use rechargeable batteries.*

If the solutions offered above do not appear to correct the problem, apply the following steps, in the order shown.

- Remove the batteries.
- Unplug the unit.
- Wait one minute for the Model 400 to completely power down.
- Plug in the unit's AC adaptor into a standard 120 VAC outlet.
- Replace the batteries.

Refer to Chapter 2, Installation, for additional information on batteries and installation procedures.

APPENDIX C: 400 QUICK REFERENCE

Parameter	Description	Key Sequence*	Range	Default
Call Delay	Time delay until first call is made	[SET] or [WHAT IS] + [CALL DELAY]	Min: 00:00 Max 60:00 (min:sec)	00:30 (min:sec)
Voice Reps	Number of times alarm message is repeated over the phone	[SET] or [WHAT IS] + [VOICE REPS]	Min: 1 rep Max: 10 reps	3 reps
Intercall Time	Time delay between phone calls	[SET] or [WHAT IS] + [INTERCALL TIME]	Min: 00:10 Max: 60:00 (min:sec)	01:00 (min:sec)
Max Calls	Number of calls until unit self-acknowledges	[SET] or [WHAT IS] + [MAX CALLS]	Min: 1 call Max: 255 calls	100 calls
Temp Limits	High and low temperature alarm limits	[SET] or [WHAT IS] + [TEMP LIMITS] + [zone #]	Min: -20°F/-30°C Max: 150°F/65°C	Low: 10°F High:100°F
Calibrate	Temperature Correction factor	[SET] or [WHAT IS] + [CALIBRATE] + [zone #]	Min: -10° Max: 10°	0°
Recognition Time: zones 1–4	Length of time a fault condition must exist to trip an alarm	[SET] or [WHAT IS]+ [RECOGNITION TIME]	Min: 00:00 Max: 540:00 (min:sec)	00:03 (min:sec)
Recognition Time: Power Failure	Length of time the power must be off to trip an alarm	[SET] or [WHAT IS] +[RECOGNITION TIME]+[POWER]	Min: 0:00 Max: 540:00 (min:sec)	05:00 (min:sec)
Recognition Time: High Sound Level	Length of time the sound must be high to trip an alarm	[SET] or [WHAT IS] +[RECOGNITION TIME]	Min: 5 Max: 60 (sec)	00:08 (min:sec)
Clock	Real time clock	[SET] or [WHAT IS] + [CLOCK] + [time] + [AM] or [PM]		12:00 AM
High Sound Level Alarm Sensitivity	Microphone sensitivity for high sound level alarm	[SET] or [WHAT IS] + [CALIBRATE] + [SOUND]	Min: 1 unit Max: 160 units	32 units
Listen Time	Length of listen-in time during call-in status report	[SET] or [WHAT IS] + [LISTEN TIME]	Min: 0 sec Max: 255 sec	15 sec
Rings Until Answer	Number of rings until unit answers an incoming call	[SET] or [WHAT IS] + [RING]	Min: 1 ring Max: 15 rings	4 rings

* press [ENTER] after all Key Sequences starting with [SET]

Parameter	Description	Key Sequence*	Range/ Response	Default
TAD	Telephone Answering Device Compatibility	[SENSOR ON/OFF] + [TAD]	Enable / Disable	Disabled
ID Number	Sets the unit's telephone number	[SET] + [ID NUMBER]	0-16	
Dialout Test	Permits testing of dialout Telephone numbers	[SET] + [TEST]+ [1-8]	1-8	
Output Mode	Sets the relay output Mode	[SET] + [OUTPUT]	1-4, *, #, PHONE	Manual
Output Control	Switches the relay output On or Off (manual mode)	[SENSOR ON/ OFF] + [OUTPUT]		Off
Voice Message	Program or recite voice messages	[SET] or [WHAT IS] + [MESSAGE]+ [RECOGNITION TiME] + [zone#]	0-4	
Zone Configuration	Program or recite zone configuration	[SET] or [WHAT IS] +[CONFIG]	temp, NO, NC	No
Call Progress	Turns call progress Detection on or off	[SENSOR ON/ OFF] + [CONFIG]	Enable / Disable	Enabled
Telephone Number	Program or recite dialout telephone numbers	[SET] + [PHONE NUMBER] + [1-8]		
Status Report	Recites a Status Report	[WHAT IS] + [STATUS]		
Run/Standby Mode	Changes the operating mode between run and standby	[RUN/STANDBY]		Run

Parameter	Description	Key Sequence	Response	Default
Speaker Mute	Turns off the speaker during alarm conditions	[SENSOR ON/OFF] + [MUTE]	On or Off	off
Designating A Zone Unused	Removes zone from status and alarm reports	[SENSOR ON/OFF] + [SET] + [zone #]	On or Off	On
Zone Enable/ Disable	Turns zone alarm detection on or off	[SENSOR ON/OFF] + [zone#]	Enabled / Disabled	Enabled
Power Alarm Enable/Disable	Turns power alarm detection on or off	[SENSOR ON/OFF] + [POWER]	Enabled / Disabled	Enabled
Sound Alarm Enable/Disable	Turns high sound level alarm detection on or off	[SENSOR ON/OFF] + [SOUND]	Enabled / Disabled	Enabled
Temperature Scale	Selects between Fahrenheit and Celsius	[SENSOR ON/OFF] + [F/C]	Fahrenheit or Celsius	Fahrenheit
Security Code	Prohibits programming changes	[SET] or [WHAT IS] + [CODE] + [4 digit code]		none
Callback Acknowledgment	Turns Callback Acknowledgment on or off	[SENSOR ON/OFF] + [PHONE]	Enabled / Disabled	Disabled

APPENDIX D: ACCESSORIES

The sensors listed below are available from Phonetics, Inc., and represent the most commonly used zone devices. Other dry contact sensors, designed for more specialized applications, may also be used. Commercial or industrial electrical supply houses can provide devices to monitor virtually any condition. For further information, contact Sensaphone Customer Service at 610-558-2700.

PART #	SENSOR / SWITCH
FGD-0006	Magnetic Reed Switch
FGD-0007	Passive Infra-Red Detector
FGD-0010	50' two-conductor #22AWG Shielded Cable
FGD-0013	Spot Water Detector
FGD-0022	Temp° Alert
FGD-0064	Surge Suppressor
FGD-0027	Humidistat
FGD-0049	Smoke Detector with Built-in Relay
FGD-0054	Power-Out Alert™
FGD-0056	Zone Water Detector w/Water Rope
FGD-0063	Additional 10' Water Rope for FGD-0056
FGD-0064	Programmable Thermostat with Remote Setback
XFR-0024	12VDC Power Supply for Thermostat
FGD-0100	Remote Temperature Sensor
FGD-0101	Weatherproof Temperature Probe
FGD-0205	Multi-Point Wireless I/O System

APPENDIX E: SPECIFICATIONS

ALERT ZONES

Number of Zones: 4 (thermistor installed on zone #1 for local temperature monitoring)

Zone Connector: terminal block

Zone Types: N.O./N.C. contact, 2.8K thermistor (-20° F to 150° F or -30° C to 65° C)

Zone Characteristics: 5.11K to 2.85V (Short circuit current: 1mA max.)

A/D Converter Resolution: 10 bits ±2 LSB

Zone Protection: 5.5VDC Metal Oxide Varistor with fast acting diode clamps.

MICROPHONE

Internal Electret Condenser: For listening in to on-site sounds and detecting high sound levels.

PHONE INTERFACE

Line RJ11 Jack: For connection to a two-wire analog telephone line. (6' modular cord included)

Extension RJ11 Jack w/ Line Seizure: For connecting other devices on the same telephone line, devices connected to this jack are disconnected in the event that the 400 must dial out for an alarm.

Phone Line Protection: Metal Oxide Varistor & self-resetting fuse

LED INDICATOR

System On: On steady when the unit is in RUN mode. LED blinks once every few seconds while in STANDBY mode.

Phone In Use: On steady when the telephone line is being used. LED blinks when no dial tone is detected. Off when telephone line is not in use.

Alarm: Off when no alarm exists. Blinks when an unacknowleged alarm exists. On steady when an acknowledged alarm exists

Battery Ok: On steady when the battery is in good condition. Blinks when the battery is low. Off when the battery must be replaced.

RELAY OUTPUT

Rated for 1A 30VAC/1A 30VDC maximum.

POWER SUPPLY

Power Supply: 120VAC/9VDC 60Hz 6W wall plug-in transformer w/6' cord.

Power Consumption: 1.5 Watts

Power Protection: Metal Oxide Varistor

Battery Backup: Six size-C alkaline batteries (not included), providing up to 24 hours of back-up time.

ENVIRONMENTAL

Operating Temperature: 32–122° F (0–50° C)

Operating Humidity: 0–90% RH non-condensing

Storage Temperature: 32°–140° F (0–60° C)

PHYSICAL

Dimensions: 2.1"h x 7.8"w x 8.8"d

Weight: 2 lbs.

Enclosure: Indoor-rated plastic housing suitable for wall or desktop installation.

Alarm: Off when no alarm exists. Blinks when an unacknowleged alarm exists. On steady when an acknowledged alarm exists

Battery Ok: On steady when the battery is in good condition. Blinks when the battery is low. Off when the battery must be replaced.

APPENDIX F: RETURNING THE UNIT FOR REPAIR

In the event that the Model 400 does not function properly, we suggest that you do the following:

1) Record your observations regarding the Model 400's malfunction.

2) Call the Technical Service Department at 610-558-2700 prior to sending the unit to Sensaphone for repair.

If the unit must be sent to Sensaphone for Servicing, please do the following:

1) Unplug the AC power supply from the wall outlet, remove the batteries, and disconnect all sensors from the alert zones.

2) Carefully pack the unit to avoid damage in transit. Use the original container (if available) or a sturdy shipping box.

3) You must include the following information to avoid shipping delays:

a) Your name, address and telephone number.

b) A note explaining the problem.

4) Ship your package to the address below:

SERVICE DEPARTMENT

SENSAPHONE

901 Tryens Road

Aston, PA 19014

5) Ship prepaid and insured via UPS or US Mail to ensure a traceable shipment with recourse for damage or replacement.

APPENDIX G: TEST LOG

Date	Inputs	Dialout	Call-In	Battery		Tested By
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	

Date	Inputs	Dialout	Call-In	Battery		Tested By
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	
	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	Pass ☐ Fail ☐	

APPENDIX J

Remedial System Optimization Table of Contents

APPENDIX J

REMEDIAL SYSTEM OPTIMIZATION TABLE OF CONTENTS

TABLE OF CONTENTS