POST-REMEDIAL ACTION
FIELD ACTIVITIES PLAN

PREFERRED ELECTRIC MOTORS
CONSTRUCTION OVERSIGHT
NYSDEC SITE # 828106

WORK ASSIGNMENT NO. D004444-27

Prepared for:

New York State Department of Environmental Conservation
Albany, New York

Prepared by:

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

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SEPTEMBER 2011

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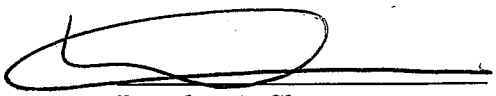
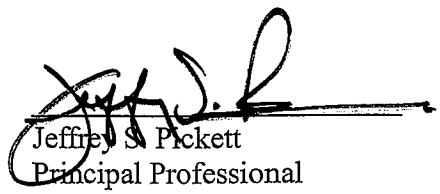


Brandon A. Shaw
Project Scientist

Approved by:



Jeffrey S. Pickett
Principal Professional

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GLOSSARY OF ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
CA	chloroethane
cis-DCE	cis-1,2-dichloroethlene
DNAPL	dense non-aqueous phase liquid
ELAP	Environmental Laboratory Approval Program
°F	degrees Fahrenheit
FAP	Field Activities Plan
H&A	Haley and Aldrich
HASP	Health and Safety Plan
IDW	investigation derived waste
MACTEC	MACTEC Engineering and Consulting, P.C.
msl	mean sea level
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PCE	tetrachloroethene
PEM	Preferred Electric Motors
QAPjP	Quality Assurance Project Plan
QAPP	Quality Assurance Program Plan
RI	Remedial Investigation

GLOSSARY OF ACRONYMS AND ABBREVIATIONS (CONTINUED)

Site	Preferred Electric Motors site
SVE	soil vapor extraction
TCE	trichloroethene
TCA	trichloroethane
$\mu g/m^3$	microgram(s) per cubic meter
µg/L	micrograms per liter
VC	vinyl chloride
VOC	volatile organic compound
WA	work assignment

1.0 INTRODUCTION

MACTEC Engineering and Consulting, P.C. (MACTEC), under contract to the New York State Department of Environmental Conservation (NYSDEC), is submitting this Post-Remedial Action Field Activities Plan (FAP) for the Preferred Electric Motors (PEM) site (Site) in Rochester, Monroe County, New York (Figure 1.1). The Site is listed as a Class 2 hazardous waste site, Site No. 8-28-106, in the Registry of Hazardous Waste Sites in New York State. This FAP has been prepared in accordance with the NYSDEC requirements in Work Assignment (WA) No. D004444-27, and with the current Superfund Standby Contract between MACTEC and the NYSDEC.

The field program will be conducted following the procedures described herein and as outlined in the Quality Assurance Program Plan (QAPP) (MACTEC, 2007a) and the Program Health and Safety Plan (HASP) (MACTEC, 2005). In addition, a site specific HASP and safety job hazard analyses plans are included as Attachment 1 of this document.

This FAP is organized into four sections as follows:

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

This FAP has been prepared for work to be conducted under Task 5 which includes the completion of additional activities to support the recently-completed remedial action at the PEM Site.

2.0 SITE BACKGROUND AND PHYSICAL SETTING

Information pertaining to the history of Site operations and past releases of contamination was reviewed to help prepare the FAP. The information collected, as well as information provided in the WA, is summarized below.

2.1 SITE LOCATION

The Site is located at 42 Fernwood Avenue, in the City of Rochester, Monroe County, New York (Figure 1.1). The Site is situated on 0.35 acres in a mixed commercial and residential use area of the City of Rochester. The property consists of a 13,215 square foot manufacturing building and a paved/gravel parking lot. The building is a one-story concrete building, with a small two story section.

The Site is located in a mixed residential/commercial zoned area. The Site itself is surrounded primarily by residential property (Figure 1.1). The east wall of the Site building is a common wall with a neighboring building. Although the current use of this adjoining building is not known, the Record Search indicated that it may be, or may have been, a machine shop. JML Optical, a designer, manufacturer and distributor of precision optical components and systems, is located approximately 60 feet northwest of the Site. A former Textile Manufacturing facility (Vogt Manufacturing Corporation) is located approximately 1300 feet east of the Site, at 100 Fernwood Avenue. The former textile facility (owned by Conifer Development) is currently participating in the NYSDEC Brownfield Cleanup Program, and investigations and/or remedial activities are currently planned for the property.

2.2 SITE HISTORY

The early history of the Site is not known. A 1911 Sanborn® Fire Insurance Map Indicates that the center portion of the Site building was constructed prior to 1911 and was used by W.A Margander and Co. Contractors (Sanborn Library, LLC, 1911). Subsequent Fire Insurance Maps indicate that the southern and northern sections of the building were added to accommodate an automobile repair shop and additional equipment storage (Sanborn Library, LLC, 1950). Later additions

include the current office space on the east side of the building and the hallway located on the west side of the building. Discussions with the current owner of the site, as well as later Fire Insurance Maps indicate that at least a portion of the facility was used for a soap manufacturing operation prior to its use by PEM (Alent, 2004).

PEM, an electric motor refurbishing company, was originally registered in the State of New York under Leon Alent doing business as PEM in 1946. PEM was incorporated in 1950. The 42 Fernwood property was purchased by Anna Alent, wife of the founder/owner of PEM in September 1951, and sold to PEM, Inc. in August, 1952. PEM operated its electric motor refurbishing business at 42 Fernwood until approximately December 2000, when most, if not all, of the operations at the property ceased. PEM employed up to a maximum of approximately 13 people in the mid 1970's (Alent, 2004). PEM operations at the site included:

- removing paper and lacquer from motor coils with two small ovens
- removing oil/residues with a small degreaser with a vented hood
- winding motors
- custom fabrication/repair of metal parts performed on metal presses, lathes, and grinders located in the main room of the building (Alent, 2004).

2.3 PREVIOUS FIELD INVESTIGATIONS

This subsection summarizes previous investigations performed at the PEM Site.

In 1999, PEM contacted Environmental Products and Services to remove drums of used solvents (primarily trichloroethene [TCE]) that had accumulated in the yard of the Site. Environmental Products and Services informed PEM that due to the condition of the drums, chlorinated solvents had spilled to the ground surface, and therefore the NYSDEC needed to be informed of the situation (MACTEC, 2007). The Spill was reported to the NYSDEC in May 2000 (MACTEC, 2007).

PEM contracted Environmental Products and Services to remove approximately fifteen 55-gallon drums of spent solvent, and remove the top several inches of soil from the Site yard for off-site disposal in May/June 2000 (MACTEC, 2007). PEM stopped remedial activities due to lack of

funds. Subsequent to the PEM surface soil removal action the, NYSDEC conducted limited surface and sub-surface soil sampling in June 2000.

In February 2001, based on the high concentration of chlorinated solvents (TCE, tetrachloroethene [PCE], and 1,1,1-trichloroethane [1,1,1-TCA]) detected in surface and sub-surface soils at the site, the NYSDEC contracted MARCOR Remediation to remove approximately 470 tons of contaminated soil and a 1000-gallon underground storage tank (reportedly contained fuel product) from the Site yard. The excavation was completed to bedrock at about eight-feet below ground surface (bgs).

In response to the high concentrations of chlorinated solvents detected in Site soils, the New York State Department of Health (NYSDOH) conducted indoor air sampling at adjacent residences in the summer and fall of 2000, and the winter of 2001. TCE and PCE were detected at concentrations of 440 micrograms per cubic meter ($\mu g/m^3$) and 510 $\mu g/m^3$, respectively, in air samples collected from the basement of 40 Fernwood Avenue, prompting an interim remedial measure. New York State guidance value for PCE is 100 $\mu g/m^3$, and the guidance value for TCE is 5 $\mu g/m^3$. In August 2000 the NYSDEC contracted MARCOR Remediation to install a soil vapor extraction (SVE) system in the basement and crawl space of the residence at 40 Fernwood Avenue. The system, consisting of a blower, a carbon filter, and three perforated polyvinyl chloride collection lines (one below the finished basement, one below the unfinished basement, and one below ground between the Site and the residence), were completed and started operating in November 2000. Samples collected from 40 Fernwood Avenue after installation of the SVE system were non-detect for TCE and PCE.

MACTEC conducted a Remedial Investigation (RI) at the Site from 2005 through 2006, which identified the following:

- secondary source areas in subsurface soils and to a lesser degree shallow bedrock exist surrounding the former removal action excavation.
- PCE was detected in soil at concentrations as high as 390,000 micrograms per kilogram, representing the potential for dense non-aqueous phase liquid (DNAPL) conditions, however, DNAPL was not observed during the Site investigation.
- Contaminants detected in groundwater included chlorinated solvent and fuel related volatile organic compounds (VOCs) above water quality standards in the area of the former excavation (MW-1), to the south of the former excavation (MW-2), and to the north of the Site (GW-2, GW-3, JML-2, and MW-5).

- The highest concentrations of solvents in groundwater of TCE (400 micrograms per liter [µg/L]), PCE (88 µg/L) and 1,1,1-TCA (2,500 µg/L) were detected in the source area well and to the south (MW-1 and MW-2) (compared to a groundwater standard of 5 µg/L for each compound).
- Concentrations of VOCs in groundwater appear to diminish from advection and dispersion within groundwater as well as with biological degradation.
- Contaminant migration downgradient in shallow groundwater appears to be influenced by sewer line trenches located under Fernwood Avenue and Portland Avenue which are excavated 2 to 6 feet into the bedrock
- Soil vapor investigations completed historically and during the RI indicate that chlorinated solvents and fuel related VOCs in groundwater are off gassing into the vadose zone. Detections of TCE and 1,1,1-TCA exceeded indoor air and/or sub-slab guidance criteria at one residential location.

MACTEC conducted a Substrate Treatability Study at the Site in 2009, which was performed by Bioremediation & Treatability Center of Walpole Massachusetts. Site groundwater quality data indicated that complex mixtures of chlorinated solvents are present at the site. The chlorinated parent contaminants are TCE and 1,1,1-TCA. Detected breakdown products (in site groundwater) of TCE and TCA include cis-1,2-dichloroethlene (cis-DCE), vinyl chloride (VC), 1,1-dichloroethane, 1,1-dichloroethene (abiotic breakdown of TCA) and chloroethane (CA). Trace amounts of cis-DCE, VC, and CA (degradation by-products of TCE and TCA) in site groundwater indicated that dechlorination is possibly on-going despite the low naturally occurring electron donor concentrations (carbon source) the microcosm study evaluated three commercially available substrates, (EHC, CAP18, and HRC), for potential carbon sources addition. The substrates were evaluated based upon the following criteria:

- parent contaminant degradation and by-product formation
- methane production, nitrate and sulfate reduction
- likelihood to cause pH depression.

The duration of the study was 180 days. The microcosm test indicated that EHC induced the fastest TCA and TCE degradation rates. CAP18 induced slower degradation of TCE and TCA, due to its low solubility within the groundwater (BTC, 2009).

MACTEC conducted a pre-design investigation from April 2009 to May 2009. The investigation included the following components:

- installation of two groundwater monitoring wells (MW-12 and MW-13)
- completion of one soil boring (TB-1)
- baseline groundwater sampling from five monitoring wells (MW-1, MW-2, MW-10, MW-12 and MW-13)
- initiation of the microcosm bench-scale test using a soil sample from TB-1 and a groundwater samples from MW-1
- a round of water levels from new and existing wells
- site survey, including a certified boundary survey.

Reported total VOC concentrations in groundwater samples collected during the pre-design investigation from existing monitoring wells MW-1, MW-2 and MW-10 were consistent with relative historical results; total VOCs detected ranged from non-detect to approximately 1,600 µg/L. May 2009 groundwater results from the newly installed on-site monitoring well (MW-12) were consistent with site groundwater conditions when compared to historical MW-2 groundwater results; total VOCs detected were approximately 1,200 µg/L and 1,500 µg/L, respectively. The newly installed monitoring well south of Fernwood Avenue (MW-13) contained relatively low-concentrations of VOCs, suggesting that some contamination is migrating across Fernwood Avenue.

2.4 PHYSICAL SETTING

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

2.4.1 Topography

The Site is located approximately 1.8 miles northeast of the center of the City of Rochester, New York (Figure 1.1), at approximately 485 feet above mean sea level (msl). The topography slopes down towards Lake Ontario, located about seven miles to the North, at an elevation of near 245 feet above msl. The topography rises slightly to the south of the site, reaching a line of small east-

west trending hills (Pinnacle Hills Moraine) three miles from the site. The hills range from 550 feet in elevation at their base, rising to between 600 and 700 feet at their summits.

The topography is relatively flat for approximately three miles to the east of the Site, before dropping sharply to Irondequoit Bay, located at an elevation of approximately 245 feet above msl. The topography is also relatively flat to the west of the Site before dropping abruptly to the Genesee River. The Genesee River is located about 1.9 miles from the site and mean water level is approximately 300 feet above msl (United States Geological Survey, 1978).

2.4.2 Climate

The climate of the area is characterized by moderately warm summers and cold winters. Mean monthly temperatures range from 24 degrees Fahrenheit (°F) in January to 70°F in July. Average annual precipitation is 32 inches. Average annual snowfall is 90 inches per year (National Climatic Data Center, 1999).

2.4.3 Surface Water Hydrology

Most of the Site is covered by the PEM building. Rainwater from the roof of the building is diverted into the city storm drains. Rainwater that does not infiltrate into the gravel portion of the driveway flows to storm drains located on Fernwood Avenue. Stormwater flows to a waste water treatment plant that discharges to Lake Ontario.

2.4.4 Groundwater Hydrology

Lake Ontario is the regional groundwater discharge area. Some local groundwater may discharge into small streams or the Genesee River prior to arrival at Lake Ontario. Groundwater at the Site should be present 10 feet bgs, in shallow bedrock, based on a generalized groundwater contour map for the Rochester area (Young, 1980). Groundwater in the vicinity of the site is interpreted to flow north-northeast towards Lake Ontario, dropping approximately 35 feet per mile (0.007 feet/foot) (Young, 1980).

2.4.5 Geology

Overburden soils at the site are approximately eight feet thick (NYSDEC, 2004).

Bedrock in the vicinity of the site consists of Upper Silurian age dolomites and shales. The Site is located on the Rochester Shale side of the contact with the Lockport Dolomite, part of the Lockport Group, and the Rochester Shale, part of the Clinton Group (Haley and Aldrich [H&A] of New York, 1990). The Rochester Shale beneath the Site is mapped as approximately 95-100 feet thick. The Rochester Shale, the upper most formation of the Clinton Group, is a "light to dark gray, fine grained fossiliferous dolomitic mudstone with interbeds of limestone and dolomite" (H&A, 1990). Clinton Group limestones and shales underlay the Rochester Shale. The sedimentary bedrock in the Rochester area generally strikes from north-west to south-east or west to east, with a dip to the south-southwest of one to two degrees (H&A, 1990).

2.5 REMEDIAL ACTION SUMMARY

The site remedy was completed in the Spring of 2011. The remediation consisted of the following major work elements:

- building floor scarifying and replacement
- erosion and sedimentation control
- select site demolition
- soil excavation in two discrete areas (Areas 1 and 2) adjacent to the PEM building for removal of VOC contamination
- bioremediation organic substrate application, and the installation of two injection points, one each in Areas 1 and 2, for future substrate injections as needed
- asphalt pavement replacement
- site restoration including fence replacement, restoration of lawn areas, and installation of new asphalt pavement

3.0 SCOPE OF WORK

To evaluate the potential threat to human health and the environment and assess the post-remedial actions for the Site, additional field investigations are planned. These activities will include collection and evaluation of groundwater, indoor air, and soil vapor conditions at and downgradient of the Site. Specifically, data collection is necessary to complete the following:

- characterize post-remediation baseline conditions of on-site and off-site groundwater
- collect a soil vapor and indoor air sample from an adjacent property
- injection of the chosen substrate (EHC) into two injection points in Area 1 and Area 2
- secure the plastic in the crawl space at 40 Fernwood Avenue, join the pipes from the basement and crawl space by a manifold, and install a riser pipe
- collect a second round of groundwater samples at the Site, approximately six-months after the EHC injections have been completed.

This FAP has been developed to satisfy the recent discussions between MACTEC and the NYSDEC for proposed post-remedial activities at the PEM site. The field work and oversight will be conducted by MACTEC and the injections will be conducted by Precision Environmental.

Figure 3.1 is an aerial photograph of the Site area and illustrates the proposed groundwater and soil vapor sampling locations. Figure 3.2 shows the reagent injection point and trench locations for Area 1 and Area 2. A summary of these field tasks and methodologies are described in more detail in Table 3.1, as well as in the following subsections. The sample IDs and the analytical program are provided in Table 3.2. The substrate injection field data record is provided in Table 3.3.

3.1 FIELD OPERATIONS

Companion documents to this FAP that will govern the execution of the field exploration activities include MACTEC's Program HASP (MACTEC, 2005) and QAPP (MACTEC, 2007). In addition to these program documents, the Site-specific HASP (Appendix A) provides details related to health and safety for on-site activities and the Site-specific Quality Assurance Project Plan (QAPjP) (Appendix B) provides sampling, analytical, and quality assurance/quality control procedures for the project.

Subcontractors chosen to support the RI include:

- Chemtech Laboratory (MACTEC subcontractor) – NYSDEC Environmental Laboratory Approval Program (ELAP) certified laboratory for the analysis of groundwater samples
- Con-Test Laboratory (MACTEC subcontractor) – NYSDEC ELAP certified laboratory services to support the Soil Vapor Intrusion sampling
- Precision Environmental Services (NYSDEC subcontractor) – to support subsurface substrate injections into reagent injection point and trenches in Area 1 and Area 2, and to reinstall the soil vapor extraction plumbing at 40 Fernwood Avenue.

3.1.1 Health and Safety

The Site-specific HASP is provided as Appendix A to this document. Based on available Site information, MACTEC anticipates the fieldwork will be conducted in Level D personal protection. Specific investigation activities and required level of personal protection are set forth in the Site-specific HASP. Criteria for upgrading or downgrading the specified level of protection are also provided in the Site-specific HASP. Additional health and safety requirements are set forth in the Program HASP (MACTEC, 2005). Should Site conditions pose a threat to those present on-Site, and/or should Site conditions warrant an upgrade from Level D, as defined by the HASP, work will stop and the situation will be reevaluated by the NYSDEC and MACTEC. The NYSDOH Community Air Monitoring Plan will also be followed and is included in Appendix A.

3.1.2 Investigation Derived Waste

In accordance with NYSDEC Program Policy DER-10 3.3 e 5 ii (2) (A), purge water will be disposed of at each well (NYSDEC, 2010).

The cited DER-10 policy states that if none of the conditions described in clause ii.(1) apply, the water may be recharged to unpaved ground into the same groundwater unit, within or directly adjacent to a source area in a manner which does not result in surface water runoff, with Department approval.

The Department has indicated that results from the wells from previous sampling are known, and that there are no issues with reintroducing purge water back to the same aquifer at the observed contaminant concentrations.

3.1.3 Mobilization

MACTEC will begin mobilization efforts in September 2011. MACTEC will mobilize to the Site and begin the fieldwork in accordance with the project schedule. The NYSDEC will be responsible for obtaining Site access. Mobilization will include acquisition of the following:

- transportation to and from the Site
- field supplies
- health and safety equipment
- decontamination supplies and equipment
- sampling equipment.

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

3.1.4 Baseline Post Remediation Groundwater Conditions

To determine groundwater conditions at the Site prior to the EHC injection, a baseline groundwater sampling round will be conducted from existing on-site and off-site monitoring wells. Figure 3.1 identifies the locations of the monitoring wells and Table 3.2 summarizes the sample IDs and analytical program.

Prior to sampling, a synoptic round of water levels will be measured. Monitoring wells will then be sampled using low-flow sampling procedures as described in the Section 4.5.4.3.2 of the QAPP (MACTEC, 2007). Samples will be collected from upgradient to downgradient locations based on the interpreted groundwater flow direction and historic analytical data. Field measurements for pH, temperature, specific conductivity, oxidation reduction potential, dissolved oxygen, and turbidity will be collected through a flow through cell (with the exception of turbidity) from each well during pre-sample purging. Field measurements and monitoring well sampling activities will be

documented using a Low Flow Groundwater Data Record and recorded in a field log book (QAPP Figure 4-16; MACTEC, 2007).

Purge water will be screened with a photoionization detector and observed for sheens and odors. If no evidence of contamination is detected then the water will be allowed to infiltrate into the ground surface at the well location.

Groundwater samples from the existing monitoring wells will be analyzed for VOCs. Laboratory analysis is described in Table 3.2 and Appendix B, Table B-1.

3.1.5 Indoor Air and Sub-Slab Soil Vapor Sampling

An indoor air and sub-slab soil vapor sample will be collected to evaluate if contaminants of concern from the Site are migrating off-Site in groundwater and creating a potential exposure pathway via vapor intrusion into the adjacent residential building. Samples will be obtained over an approximate 24 hour period (flow rate will be less than 0.2 liters per minute as required by NYSDOH) and collected as described below.

Prior to collecting samples, an indoor air survey will be completed using the NYSDOH "Indoor Air Quality Questionnaire and Building Inventory" form. Sample collection procedures are further described in the QAPP. The soil vapor sample will be collected from below the structures' concrete slab. A one-inch diameter hole will be drilled with a hammer drill two inches into the building floor, near the center of the basement/slab-on grade, but away from any cracks or sumps. The hole will be continued with a 3/8-inch drill bit, until the building slab is penetrated. The hole will be continued approximately three inches below the slab. The hole will then be swept to remove drill cuttings/dust from the area. A ¼-inch piece of Teflon tubing will be inserted through a 1" diameter rubber stopper, and placed into the hole, so that the bottom of the tubing is below the slab floor and the stopper rests inside the one-inch hole, forming a seal (ensuring that the bottom of the tubing does not become blocked with dirt/concrete at the bottom of the hole). The stopper will then be covered with bee's wax to provide a seal to prevent the migration of indoor air into the sub-slab. One 60 cubic centimeter volume of air will be purged from the tubing with a polyethylene syringe. The syringe will be capped and the air released outside the building as to not interfere with the

indoor air sample collection. An individually certified clean, SUMMA®-type canister with a 24-hour flow valve will be connected to the tubing as described in the QAPjP.

The indoor air sample will be collected in individually certified clean, SUMMA®-type canisters from the vicinity of the sub-slab vapor sample collection points. MACTEC will collect the indoor air sample away from sumps, and if standing water is present it will be noted on the sampling form. The indoor air sample will be collected from approximately four to six feet above the floor level (if necessary, Teflon tubing will be extended from the canister to attain the proper intake height). Indoor air samples will be set up with 24-hour flow valves.

An ambient air sample will be collected in individually certified clean, SUMMA®-type canisters from the vicinity of the homes being sampled for indoor air and sub-slab vapor VOC contamination. The sample will be collected from approximately four to six feet above ground surface. The ambient air sample will be set up with 24-hour flow valves.

Once the sub-slab vapor sample canister, indoor air sample canister, and exterior ambient air canister have been set up with 24-hour flow valves for an individual location, the valves from all containers will be opened. The time of sample collection, canister vacuum (in inches Mercury), weather conditions, and barometric pressure will be recorded on the field data record.

Approximately 24 hours after sample collection, the flow valves will be shut off. The time and remaining vacuum in the canister and barometric pressure will be noted on the field data record. The samples will be shipped to Con-test for analyses of VOCs via United States Environmental Protection Agency Method TO-15 with a detection limit of 1 $\mu g/m^3$ for most compounds and a detection limit of 0.25 $\mu g/m^3$ for TCE, VC and carbon tetrachloride in the indoor/ambient air samples.

Upon completion of the sampling, the tubing and stopper will be removed from the building floor and the holes will be filled completely with a fast drying hydraulic concrete (i.e. Quickcrete).

Indoor air and soil vapor sampling activities will be documented using an Indoor Air Sampling Record (QAPP Figure 4-18, MACTEC, 2007). Table 3.2 summarizes the sample IDs and analytical program

3.1.6 Subsurface Substrate Injections

A Substrate Treatability Study was performed in 2009 indicated that the EHC product was the most suitable amendment for the Site, and therefore it will be used and evaluated during the injections. Precision Environmental Services will conduct the subsurface injections, under the supervision and direction of MACTEC, of the EHC substrate into two permanent points at the Site. EHC will be delivered to the subsurface via reagent injection points and infiltration trenches, located in Area 1 and Area 2 (Figure 3.2).

Injections will be conducted by pumping a diluted mixture of EHC into the reagent injection points under pressure. Dilute amendment will be pumped from the dilution tank or mixing vessel to the reagent injection points with equipment provided by Precision Environmental. Use of a flow meter, pressure gauge, throttling valve, sight gauge, and other related equipment at the injection point will allow for precise control of injection volumes and rates. Depending on the ability of the subsurface material to accept the amendment, adjustment of the pump RPM's and pressure will be needed to ensure liquid is flowing at a slow and steady rate into the injection point. The Area 1 reagent injection point and trench will receive approximately 275 pounds of EHC. The Area 2 reagent injection point and trench will receive approximately 255 pounds of EHC.

Ease or difficulty of injection will be observed, and noticeable surface breakouts of the injected substrate material, if observed, will be noted on a field data records (Table 3.3). Additional notes on injection locations, pressures, amount of amendment injected per location, and locations of observed surface breakout will also be recorded by MACTEC on the field data record.

3.1.7 SVE Plumbing at Adjacent Residence

Precision Environmental Services will secure the plastic in the crawl space at 40 Fernwood Avenue, join the pipes from the basement and crawl space by a manifold, and install a riser pipe. Later, based on the results of the soil vapor intrusion sampling, NYSDEC may request that a fan/blower be installed on the riser pipe.

3.1.8 Post Injection Groundwater Monitoring

To evaluate post injection groundwater conditions at the Site, a second round of groundwater samples will be collected from existing on-site and off-site monitoring wells. Figure 3.1 identifies the locations of the monitoring wells and Table 3.2 summarizes the sample IDs and analytical program.

Prior to sampling, a synoptic round of water levels will be measured. Monitoring wells will be sampled as described in the Section 3.1.4 of this FAP. Field measurements and monitoring well sampling activities will be documented using a Low Flow Groundwater Data Record and recorded in a field log book (QAPP Figure 4-16; MACTEC, 2007).

Groundwater samples from the existing monitoring wells will be analyzed for VOCs. Laboratory analysis is described in Table 3.2 and Appendix B, Table B-1.

3.1.9 Post-Remedial Action Report

A report will be prepared following completion of the post-remedial action investigation and review of the analytical data, including a Data Usability Summary Report prepared in accordance with the "Guidance for the Development of Data Usability Reports" (NYSDEC, 1997). The report will present the analytical data and discuss the post-remedial action investigation results.

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Young, R., 1980. Generalized Groundwater Contour Map, for the East Rochester, New York Quadrangle. February 2000.

TABLES

Table 3.1: Proposed Field Tasks and Methodology

LOCATION TYPE	LOCATION ID	DESCRIPTION AND METHODOLOGY	RATIONALE	ANALYTICAL
Sub-Slab Soil Vapor and Indoor Air	FE-019	Collect an indoor air and sub-slab vapor sample from a residential properties adjacent to the site.	Indoor air and sub slab vapor samples will be obtained to provide data regarding vapor migration pathways and potential exposure points at additional residences.	TCL VOCs (USEPA Method TO-15)
Post-Remediaiton Baseline Monitoring Well Groundwater Samples	MW-2, MW-4, MW-5, MW-6, MW-7, MW-10, MW-12, MW-13, JML-1 and JML-2	Collect baseline groundwater samples from existing on-site and off-site monitoring wells.	Groundwater samples will be obtained to evaluate groundwater quality.	TCL VOCs (USEPA Method 8260B)
Groundwater Monitoring Well Sampling (Round 2)	MW-2, MW-4, MW-5, MW-6, MW-7, MW-10, MW-12, MW-13, JML-1 and JML-2	Collect baseline groundwater samples from existing on-site and off-site monitoring wells, six-months after conducting the substrate injections	Groundwater samples will be obtained to evaluate groundwater quality post-injection	TCL VOCs (USEPA Method 8260B)

NOTES:

TCL	Target Compound List
VOCs	Volatile Organic Compound analyzed by USEPA Method 8260B

Table 3.2: Proposed Sample Identification and Analyses

					Groundwater Samples			Air Samples
Site Type	**Media**	**Location ID**	**Sampling Interval (feet bgs)**	**Sample ID**	**VOCs 8260B**	**DUP**	**MS/ MSD**	**VOC TO-15**
Baseline Monitoring Well Sampling								
On-Site Monitoring Well	Groundwater	MW-2	14 - 24	828106MW00201901XX	1			
Off-Site Monitoring Well	Groundwater	MW-4	6.2 - 16.2	828106MW00401101XX	1			
Off-Site Monitoring Well	Groundwater	MW-5	7 - 17	828106MW00501201XX	1			
Off-Site Monitoring Well	Groundwater	MW-6	6.7 - 16.7	828106MW00601101XX	1	1		
Off-Site Monitoring Well	Groundwater	MW-7	10 - 20	828106MW00701501XX	1			
Off-Site Monitoring Well	Groundwater	MW-10	10 - 20	828106MW01001501XX	1			
On-Site Monitoring Well	Groundwater	MW-12	8.1 - 17.6	828106MW01201201XX	1			
Off-Site Monitoring Well	Groundwater	MW-13	8.2 - 23	828106MW01301501XX	1		1	
Off-Site Monitoring Well	Groundwater	JML-1	2 - 7	828106JML0100601XX	1			
Off-Site Monitoring Well	Groundwater	JML-2	2 - 7	828106JML0200601XX	1			
Second Round Monitoring Well Sampling								
On-Site Monitoring Well	Groundwater	MW-2	14 - 24	828106MW00201902XX	1			
Off-Site Monitoring Well	Groundwater	MW-4	6.2 - 16.2	828106MW00401102XX	1			
Off-Site Monitoring Well	Groundwater	MW-5	7 - 17	828106MW00501202XX	1		1	
Off-Site Monitoring Well	Groundwater	MW-6	6.7 - 16.7	828106MW00601102XX	1	1		
Off-Site Monitoring Well	Groundwater	MW-7	10 - 20	828106MW00701502XX	1			
Off-Site Monitoring Well	Groundwater	MW-10	10 - 20	828106MW01001502XX	1			
On-Site Monitoring Well	Groundwater	MW-12	8.1 - 17.6	828106MW01201202XX	1			
Off-Site Monitoring Well	Groundwater	MW-13	8.2 - 23	828106MW01301502XX	1			
Off-Site Monitoring Well	Groundwater	JML-1	2 - 7	828106JML0100602XX	1			
Off-Site Monitoring Well	Groundwater	JML-2	2 - 7	828106JML0200602XX	1			
Sub-Slab/Indoor Air Sampling								
Sub-Slab Soil Vapor	Soil Vapor	FE-SV-01	NA	828103-SV-FE019-01				1
Indoor Air	Basement Air	FE-IA-01	NA	828103-IA-FE019-02				1
Ambient Air	Ambient Air	FE-AA-01	NA	828103-AA-FE019-03				1
TOTAL SAMPLES					20	2	2	3

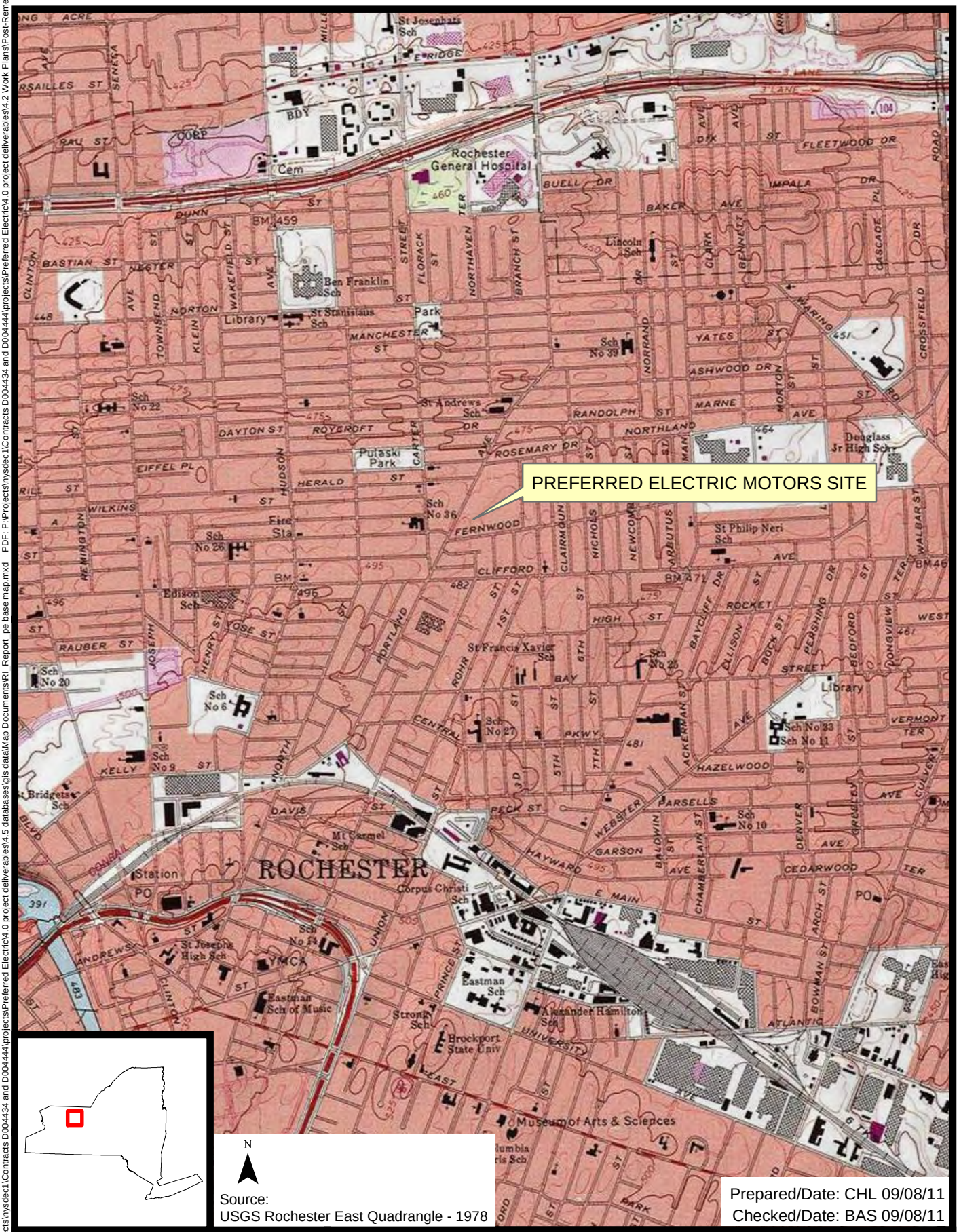
NOTES:
Sample ID: 828106 = NYSDEC Site No.; 019 represents the 3 digit sample depth bgs be determined in field; 01 = sampling round; XX = QAQC code
8260B VOCs = Target Compound List Volatile Organic Compounds
TO-15 = Target Compound List Volatile Organic Compounds
Field Quality Control samples (duplicates, matrix spike, matrix spiked duplicates) will be collected at a frequency of 5% (1:20 samples).
TBD = To Be Determined
bgs = below ground surface
NA = not applicable

Table 3.3: Substrate Injection Field Data Record

Reagent Injection Point ID	Date	Time Start	Time Stop	Injection Depth (feet below ground surface)	Vol Injected (gallons)	Vol Injected (total gallons)	Comments

Logged By: _____ Checked By: _____

FIGURES



Prepared/Date: CHL 09/08/11
Checked/Date: BAS 09/08/11

NYSDEC
Preferred Electric Motors Site
Rochester, New York

MACTEC

Site Location
Field Activities Plan
Project 3612102171 Figure 1.1

Document: P:\Projects\nysdec1\Contracts D004434 and D004444\projects\Preferred Electric\4.0 project deliverables\4.5 databases\gis data\Map Documents\RI_Report_pe base map.mxd PDF: P:\Projects\nysdec1\Contracts D004434 and D004444\projects\Preferred Electric\4.0 project deliverables\4.2 Work Plans\Post-Remedial Action FA

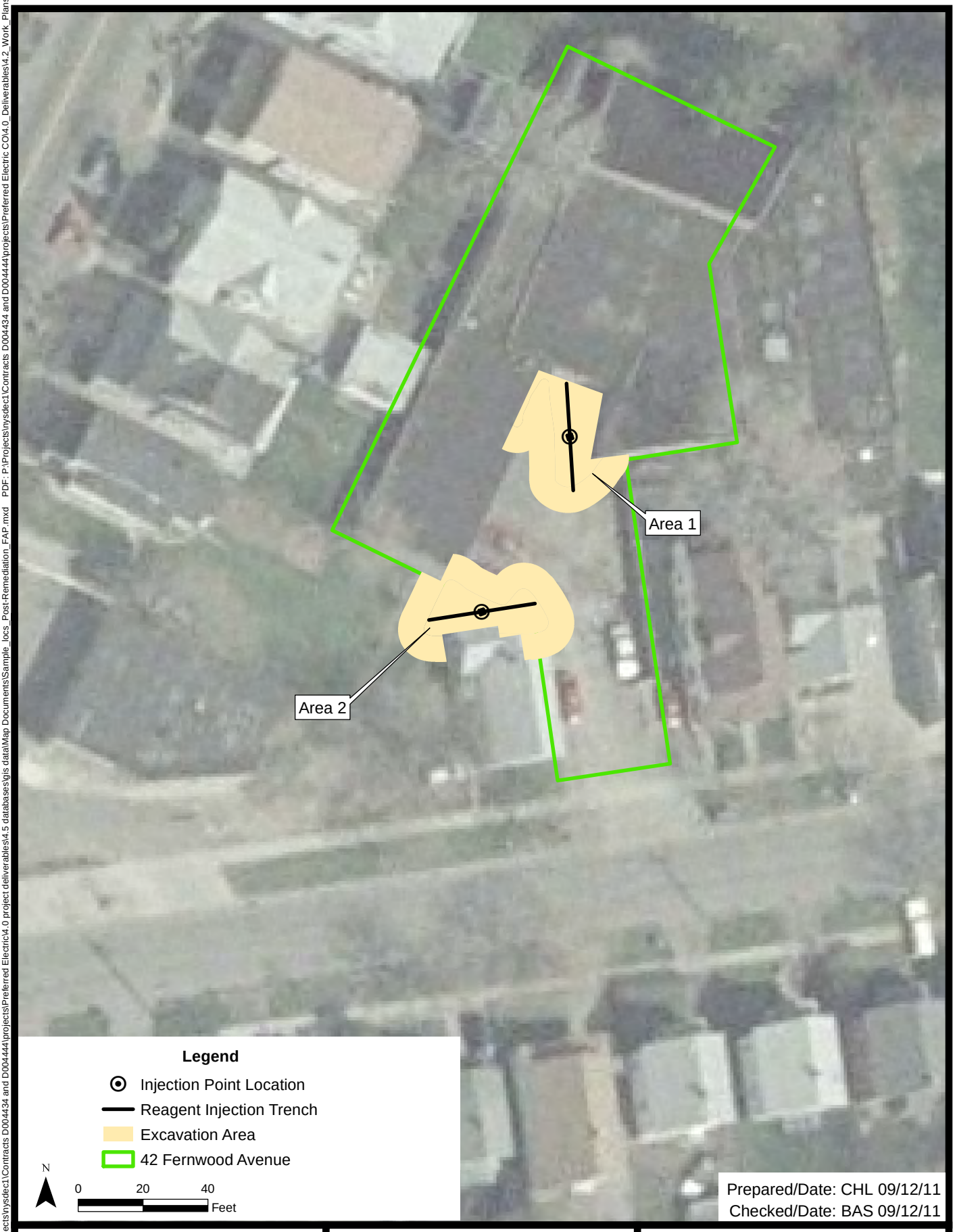
Prepared/Date: CHL 09/12/11
Checked/Date: BAS 09/12/11

NYSDEC
Preferred Electric Motors Site
Rochester, New York

MACTEC

Sample Locations
Field Activities Plan
Project 3612102171 Figure 3.1

Document: P:\Projects\nysdec1\Contracts D004434 and D004444\projects\Preferred Electric\4.0 project deliverables\4.5 databases\gis data\Map Documents\Sample_locs_Post-Remediation_FAP.mxd PDF: P:\Projects\nysdec1\Contracts D004434 and D004444\projects\Preferred Electric CO\4.0_Deliverables\4.2_Work_Plans\Post-Remedi



Prepared/Date: CHL 09/12/11
Checked/Date: BAS 09/12/11

NYSDEC
Preferred Electric Motors Site
Rochester, New York

MACTEC

Substrate Injection Locations
Field Activities Plan
Project 3612102171 Figure 3.2

ATTACHMENT A

MACTEC SHORT FORM HEALTH AND SAFETY PLAN

MACTEC, Inc.

MACTEC Short Form HASP

Site: Preferred Electric Motors Field Activities Plan Job/Task Number: 3612102171-05.01
Street Address: 42 Fernwood Road, Rochester, New York
Proposed Date(s) of Investigation: September 2011 and March 2012
Prepared by: Brandon Shaw Date: September 6, 2011
*Approved by: Kendra Bavor, CSP, Date: September 8, 2011
Site Description: **(attach map)** Former electric motors refurbisher. Located in urban residential area
Comments: Work entails two groundwater sampling events (10 monitoring wells), sub-slab soil vapor and indoor air sampling and subcontractor reagent injection oversight.

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

Tasks:

MACTEC	Subcontractor	Task Description
☒	☐	Groundwater Sampling
☒	☐	Sub-slab Soil Vapor and Indoor Air Sampling
☐	☒	Subsurface Substrate Injection – Conducted by Precision Environmental

Dates of Required Training and Medical Surveillance (add additional training topics, as required**):**

Name	Brandon Shaw	Jeri Kiburz			
Job duties	**Oversight Lead**	**Sampling and Inspections**			
	Dates	**Dates**			
Medical Surveillance	6/30/11	5/12/11			
40-Hour Initial	5/13/2005	6/18/93			
8-Hour Supervisor [3]	4/13/2006	NA			
8-Hour Refresher	6/8/2011	3/28/11			
First Aid	7/1/2009	6/1/09			
CPR	7/1/2009	6/1/09			
Hazard Communication	5/14/2007	4/1/10			

[2] At least one worker must be trained in First Aid/CPR and should received Bloodborne Pathogen Training
[3] Required for Field Lead and Site Health and Safety Officer

Known or Suspected Contaminants (include PELs/TLVs):

Contaminants of Concern	Historical Highest Soil Sample Data (mg/Kg)	May 2009 Groundwater Results (ug/L)	PEL/TLV (PPM)	Fact Sheet Included
tetrachloroethene	12	98	25	Yes
trichloroethene	0.780	350	10	Yes
1,1,1-trichloroethane	240	270	350	Yes
1,1-dichloroethene	0.420	27	1	Yes
1,1-dichloroethane	1.4	450	100	Yes
Vinyl Chloride		17	1	

*Workers must be made aware of the signs, symptoms, and first aid for each COC. Information is located on the COC fact sheets.

Air Monitoring Action Levels:

PID/FID Reading[1]	Detector Tube[1]	Dust Meter[1]	LEL[2]/O_2[1]	Action
< background				Continue working at Modified Level D
≥ background	<0.5 ppm			Monitor with Vinyl Chloride Draeger tube. Back off, contact LHSR. Upgrade to Level C PPE required.
≥ background	≥ 0.5ppm			Back off, contact LHSR. Upgrade to Level C PPE required.
≥ 6			>10% LEL	Stop work. Evacuate area. Consider return with ventilation system and spark proof/intrinsically safe equipment.
			<19.5% O_2	Stop work and evacuate area.

[1] Sustained readings measured in the breathing zone
[2] Readings at measured at the source (borehole, well, etc.)

JHAs: Check and attach all that apply (add applicable JHAs not already listed):

Activity Specific JHAs:

☒	Mobilization/Demobilization and Site Preparation
☒	Field Work - General
☒	Field Work - Oversight
☒	Decontamination
☐	Utility Clearance Activities
☒	Groundwater Sampling
☐	Soil Sampling
☐	Drilling Operation (MACTEC Driller)
☐	Geoprobe (MACTEC Geoprobe Operator)
☐	Excavations and Backfilling
☐	Stream/Wetlands Work

Hazard Specific JHAs:

☒	Insect Stings and Bites
☒	Gasoline
☒	Working with Preservatives (Acids)
☐	Landfills
☐	Surface Water Sampling
☒	Static Groundwater Level Measurements
☒	Sub-Slab Indoor Air Sampling
☐	
☐	
☐	
☐	

HAZARD IDENTIFICATION SUMMARY

Complete the checklist for summarizing the hazards identified in the JHAs

Standard Hazards			
☐ Falling Objects	☒ Slips and trips	☐ Pinch points	☐ Rotating equipment
☐ Falls	☐ Power equipment/tools	☐ Elevated work surfaces	☐ _____
Eye Hazards			
☐ Particulates	☒ Liquid splashes	☐ Welding Arc	☐ _____
Hearing Hazards			
☒ None	☐ Impact noise	☐ High frequency noise	☐ High ambient noise

Respiratory Hazards						
☒ None	☐ Dust/aerosols/particulates	☐ Organic Vapors	☐ Acid Gases	☐ O_2 deficient	☐ Metals	☐ Asbestos

Chemical Hazards			
☐ None	☒ Organic solvents	☐ Reactive metals	☐ PCBs
☒ Acids / bases	☐ Oxidizers	☐ Volatiles/Semi-volatiles	☐ _____

Environmental Hazards				
☐ None	☒ Cold Stress	☒ Heat Stress	☒ Wet location	☒ Bio hazards (snakes, insects, spiders, poisonous plants, etc.)
☐ Explosive vapors	☐ Confined space	☐ Engulfment Hazard	☐ _____	

Electrical Hazards				
☒ None	☐ Energized equipment or circuits	☐ Overhead utilities	☐ Underground utilities	☐ Wet location

Fire Hazards			
☒ None	☐ Cutting, welding, or grinding generated sparks or heat sources	☐ Flammable materials present	☐ Oxygen enriched location

Ergonomic Hazards					
☒ Lifting	☒ Bending	☐ Twisting	☐ Pulling/tugging	☐ Repetitive motion	☒ Carrying
Computer Use in the: ☐ Office ☐ Field			☐ _____	☐ _____	

Radiological Hazards						
☒ None	☐ Alpha	☐ Beta	☐ Gamma/X-rays	☐ Neutron	☐ Radon	☐ Non-Ionizing

Other Hazards
☐

PPE and Monitoring Instruments

Initial Level of PPE *			
☒ Level D	☐ Modified Level D	☐ Level C	* Cannot use Short Form HASP for Level B or A work

Standard PPE					
☒ Hard Hat	☒ Safety boots	☒ Safety glasses	☐ Chem. Resistant Boots	☒ High visibility vest	☐ Other:____

Eye and Face Protection			
☐ Face shield	☐ Vented goggles	☐ Unvented goggles	☐ Indirect vented goggles

Hearing Protection			
☐ Ear plugs	☐ Ear Muffs	☐ Ear plugs and muffs	☐ Other _____

Respiratory Protection					
☒ None	☐ Dust mask	☐ Full Face APR	☐ Half Face APR	Cartridge Type: ____	Change Cartridges: _____

Protective Clothing			
☒ Work uniform	☐ White uncoated	☐ Poly-coated Tyvek®	☐ Saranex®

	Tyvek®		
☐ Boot covers	☒ Reflective vest	☐ Chaps or Snake Legs	☐ Other _____

Hand Protection

☐ None	☐ Cotton gloves	☐ Leather gloves	☐ Glove liners	☐ Cut-resistant gloves	☐ Other _____

☒ Outer Gloves: List Type____nitrile_____	☐ Inner Gloves: List Type_____

Monitoring Instruments Required*

Periodic monitoring shall be conducted when the possibility of an IDLH condition or flammable atmosphere has developed or when there is indication that exposures may have risen over permissible exposure limits or published exposure levels since prior monitoring. Situations where it shall be considered whether the possibility that exposures have risen are as follows:

- When work begins on a different portion of the site.
- When contaminants other than those previously identified are being handled.
- When a different type of operation is initiated (e.g., drum opening as opposed to exploratory well drilling.)
- When employees are handling leaking drums or containers or working in areas with obvious liquid contamination (e.g., a spill or lagoon.)

☐ LEL/O2 Meter	☒ PID: ☐ 10.0-10.6 eV Lamp ☒ 11.7 eV Lamp	☐ FID	☐ Hydrogen Sulfide/Carbon Monoxide

☐ Dräger Pump (or equivalent) List Tubes_____	☐ Dust Meter: ☐ Respirable dust ☐ Total dust	☐ Other _____

*Monitoring instruments will be calibrated daily in accordance with manufacturer's instructions. Results will be recorded in the field logbook.

Chemicals Brought to the Site:
List all chemicals brought to the site (e.g., preservatives, decon solutions, calibration gases, gasoline, etc.).

Chemicals (Note: Name listed must match name on label and MSDS)	**MSDS Attached?**
Hydrochloric Acid, Reagents ACS	☒
Alconox/ Liquinox – For Decontamination	☒
ORP Solution	☒
YSI pH solutions (4 and 7)	☒
Conductivity Solution	☒
Gasoline	☒

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

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

☐ Warning Tape
☐ Cones and Barriers
☒ Visual Observations

Decontamination Procedures and Equipment:
Note: See Decontamination JHA for further information

Level D Decontamination Procedures

Decontamination Solution:	Detergent and Water
Station 1: Equipment Drop	Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, etc. on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool-down station may be set up within this area.
Station 2: Outer Boots, and Gloves Wash and Rinse (if worn)	Scrub outer boots, and outer gloves decon solution or detergent water. Rinse off using copious amounts of water.
Station 3: Outer Boot and Glove Removal (if worn)	Remove outer boots and gloves. Deposit in plastic bag.
Station 4: Inner glove removal	Remove inner gloves and place in plastic bag.
Station 5: Field Wash	Hands and face are thoroughly washed. Shower as soon as possible.

Modified Level D and Level C PPE Decontamination Procedures

Decontamination Solution:	Detergent and Water
Station 1: Equipment Drop	Deposit equipment used on-site (tools, sampling devices and containers, monitoring instruments, radios, etc. on plastic drop cloths. Segregation at the drop reduces the probability of cross contamination. During hot weather operations, a cool-down station may be set up within this area.
Station 2: Outer Garment, Boots, and Gloves	Scrub outer boots, outer gloves, and splash suit with decon

	Wash and Rinse	solution or detergent water. Rinse off using copious amounts of water.
Station 3:	Outer Boot and Glove Removal	Remove outer boots and gloves. Deposit in container with plastic liner.
Station 4:	Canister or Mask (Level C only) Change	If worker leaves exclusion zone to change canister (or mask), this is the last step in the decontamination procedure. Worker's canister is exchanged, new outer gloves and boot covers are donned, joints are taped, and worker returns to duty.
Station 5:	Boot, Gloves and Outer Garment Removal	Boots, chemical resistant splash suit, and inner gloves are removed and deposited in separate containers lined with plastic.
Station 6:	Face Piece Removal (Level C only)	Facepiece is removed. Avoid touching face with fingers. Facepiece is deposited on plastic sheet.
Station 7:	Field Wash	Hands and face are thoroughly washed. Shower as soon as possible.

Site Communication:

- ☒ Verbal
- ☐ Two-way radio
- ☐ Cellular telephone
- ☐ Hand signals
  - Hand gripping throat ---------- Out of air, can't breathe
  - Grip partner's wrist or both hands around waist ---------- Leave area immediately
  - Hands on top of head ---------- Need assistance
  - Thumbs up ---------- OK, I am all right, I understand
  - Thumbs down ---------- No, negative
- ☐ Horn
- ☐ Siren
- ☐ Other:

EMERGENCY CONTACTS

NAME	TELEPHONE NUMBERS		DATE OF PRE-EMERGENCY NOTIFICATION (if applicable)
Fire Department:	911		
Hospital: St. Elizabeth's Medical Center	(315) 798-8100		
AMEC WorkCare	1 (888) 449-7787		
Police Department:	911		
Site Health And Safety Officer:	Office:	Cell:	
Client Contact:	Office: Will Welling	Office: 518-402-9813	
Project Manager:	Office: Jayme Connolly	Cell: (207) 205-3155	

Regional EH&S Manager: Cindy Sundquist	Office: 207-828-3309	Cell: 207-650-7593 Home: 207-892-4402	
EPA/DEP (if applicable):			
OTHER: Ambulance	911		

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

- ☒ Field First Aid Kit (including bloodborne pathogen kit/supplies)
- ☐ Fire Extinguisher (ABC type)
- ☐ Eyewash (Note: 15 minutes of free-flowing fresh water)
- ☐ Other:
- ☒ Flashlights/ lighting

Provide lighting. Be aware of sub-basements. Use caution walking on covered flooring. Use caution on ladders and stair ways. Minimize dust from work and vermin wastes. Be aware of spiders and insects. Test breathing air of closed/ stagnant spaces. Run generator outdoors away from building intakes. Be aware of overhead and in slab pipes or electrical conduits.

EMERGENCY PROCEDURES

- The HSO (or alternate) should be immediately notified via the on-site communication system. The HSO assumes control of the emergency response.
- The HSO notifies the Project Manager and client contact of the emergency. The HSO shall then contact the Division ES&H Manager who will then contact the Corporate EH&S Manager.
- If applicable, the HSO shall notify off-site emergency responders (e.g. fire department, hospital, police department, etc.) and shall inform the response team as to the nature and location of the emergency on-site.
- If applicable, the HSO evacuates the site. Site workers should move to the predetermined evacuation point (See Site Map).
- For small fires, flames should be extinguished using the fire extinguisher. Large fires should be handled by the local fire department.
- In an unknown situation or if responding to toxic gas emergencies, appropriate PPE, including SCBAs (if available), should be donned. If appropriate PPE is unavailable, site workers should evacuate and call in emergency personnel.
- For chemical spills, follow the job specific JHA for spill containment
- If chemicals are accidentally spilled or splashed into eyes or on skin, use eyewash and wash affected area. Site worker should shower as soon as possible after incident.
- If a worker is injured, first aid shall be administered by certified first aid provider If a worker is injured, first aid shall be administered by certified first aid provider. See the AMEC Incident Flow Chart provided in the text below.
- If the emergency involves toxic gases, workers will back off and reassess. Prior to re-entering the work zone, the area must be determined to be safe. Entry will be using Level B PPE and utilize appropriate monitoring equipment to verify that the site is safe.
- An injured worker shall be decontaminated appropriately.
- Within 24 hours after any emergency response, the Incident Analysis Report (and Vehicle Incident Report if vehicle incident) shall be completed and returned to the Division ES&H Manager, who will forward a copy to the Corporate ES&H Manager and General Counsel. Injuries requiring medical treatment beyond first aid (as well as work-related vehicle incidents) will require the employee to submit a post incident drug test.

Incident Flow Chart

Call Within 60 Minutes

Incident Occurs

- **EMERGENCY** → **CALL 911 EMERGENCY** → **Supervisor Immediately Calls** After Medical Attention is Sought and Provided → **Contact Supervisor HSE Coordinator and WorkCare (24/7) Hotline (888) II-XPRTS or (888) 449-7787**
- **NON-EMERGENCY** → *Within 60 Minutes* → **Contact Supervisor HSE Coordinator and WorkCare (24/7) Hotline (888) II-XPRTS or (888) 449-7787**

Verbally Contact One HSE Representative Below Within 2 Hours

E&I Corporate HSE Department Contacts List

Name/E-Mail	Office Location	Contact Information
Bruce Voss bruce.voss@amec.com	Cathedral City, CA	760.202.3737 (office) 951.897.6381 (cell)
Chad Barnes chad.barnes@amec.com	Tempe, AZ	480.940.2320 (office) 480.495.9846 (cell)
Cindy Sundquist cynthia.sundquist@amec.com	Portland, ME	207.828.3309 (office) 207.650.7593 (cell) 207.892.4402 (home)
Don Kubik don.kubik@amec.com	Oakland, CA	510.663.4100 (office) 510.368.6433 (cell)
Gabe Sandholm gabe.sandholm@amec.com	Minneapolis, MN	612.252.3785 (office) 425.698.9156 (cell)
Howard Gordon howard.gordon@amec.com	Golden, CO	303.273.5041 (office) 303.888.3233 (cell)
John Mazur john.mazur@amec.com	Wilmington, NC	910.452.1185 x 16 (office) 910.431.2330 (cell) 910.681.0538 (home)
Lori Dowling lori.dowling@amec.com	Prince George, BC	250.564.3243 (office)
Philip Neville philip.neville@amec.com	Thorold, ON	905.687.6616 (office) 905.380.4465 (cell)
Tim Kihn tim.kihn@amec.com	Edmonton, AB	780.944.6363 (office) 780.717.5058 (cell)
Vlad Ivensky (can call 24/7) vladimir.ivensky@amec.com	Plymouth Meeting, PA	610.877.6144 (office) 484.919.5175 (cell) 215.947.0393 (home)

**High potential near misses, subcontractor incidents, regulatory inspections, spills, and property damage greater than $1000, should be reported within 60 minutes to one of the above HSE Representatives.*

Version Date: July 27, 2011

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

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Routes to Emergency Medical Facilities

HOSPITAL(for immediate emergency treatment):

Facility Name: Rochester General

Address: 1425 Portland Avenue, New York 14621

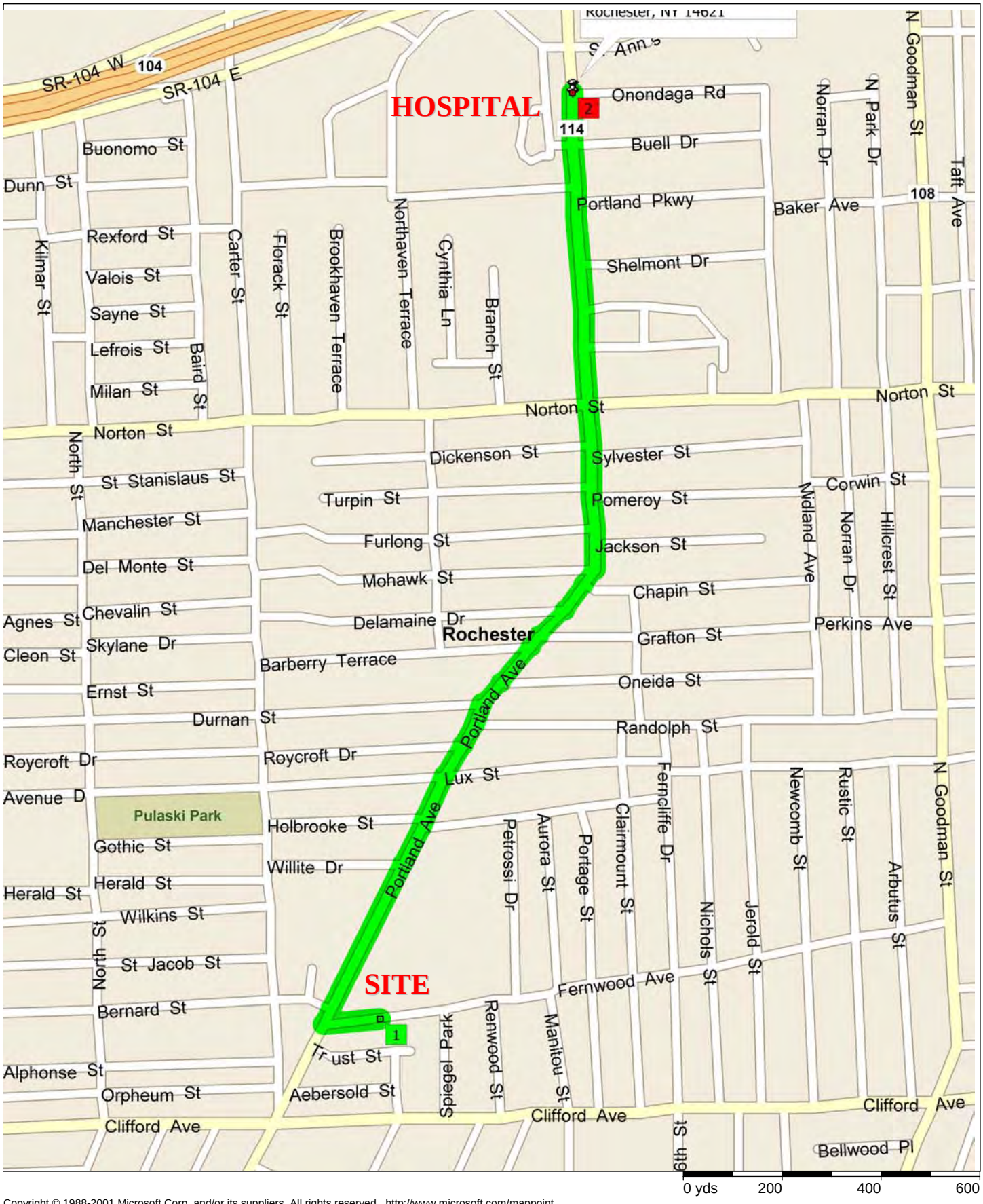
Telephone Number: (585) 922-4000

DIRECTIONS TO PRIMARY HOSPITAL (attached figure):

Depart 42 Fernwood Ave, Rochester, New York 14621 on Fernwood Avenue (West) for 109 yds
Turn RIGHT (North) onto Portland Avenue for 1.0 miles
Continue (North) on CR-114 [Portland Avenue] for 0.1 miles
Arrive 1425 Portland Avenue, Rochester, New York 14621.

Primary Hospital - Rochester General

1.2 miles; 3 minutes



9:00 AM	0.0 mi	1 Depart 42 Fernwood Ave, Rochester, NY 14621 on Fernwood Ave (West) for 109 yds
9:00 AM	0.1 mi	Turn RIGHT (North) onto Portland Ave for 1.0 mi
9:03 AM	1.1 mi	Continue (North) on CR-114 [Portland Ave] for 0.1 mi
9:03 AM	1.2 mi	2 Arrive 1425 Portland Ave, Rochester, NY 14621

Route Summary

Total journey cost	$0.10
Driving distance	1.2 miles
Trip duration	3 minutes
Driving time	3 minutes
Crow's flight distance between all stops	1.1 miles

Route Segment Details

From	To	Method	Distance	Driving Time
42 Fernwood Ave, R...	1425 Portland Ave, ...	Quickest	1.2 miles	3 minutes

Distance by State/Province

State/Province	Distance	Driving Time
New York	1.2 miles	3 minutes

DAILY TAILGATE SAFETY MEETING CHECKLIST

Project: _____ Site: _____

Date: Location:

To be reviewed on the first day of site activities and when new workers arrive on site:

Agenda:

During the project, one or more of the agenda items could be selected for the required daily site training.

		Check-off: Date				
		__	__	__	__	__
1.	Planned work for this day (discuss)	☐	☐	☐	☐	☐
2.	Physical hazards and controls (discuss/review)	☐	☐	☐	☐	☐
3.	Chemical hazards and controls (discuss/review)	☐	☐	☐	☐	☐
4.	Biological hazards and controls (discuss/review)	☐	☐	☐	☐	☐
5.	Personal protective equipment Modified D	☐	☐	☐	☐	☐
6.	Personal protective equipment required per the hazard assessment:	☐	☐	☐	☐	☐

SPECIFY TYPE	
Protective coveralls	
Safety glasses/goggles	ANSI approved
Hard hat	ANSI approved
Foot protection	Safety toe boots & overboots
Work gloves	
Chemical gloves	Neoproene outer, nitrile inner
Hearing protection	
Other	

7.	Review inspection and maintenance procedures and the limitations of the PPE to be used.	☐	☐	☐	☐	☐
8.	Decontamination procedure (discuss/review)	☐	☐	☐	☐	☐
9.	Exclusion zone maintained	☐	☐	☐	☐	☐
10.	Site emergency response plan (discuss/review)	☐	☐	☐	☐	☐
11.	Signs and symptoms of overexposure to chemicals anticipated on site	☐	☐	☐	☐	☐
12.	General health and safety rules	☐	☐	☐	☐	☐
13.	Specific health and safety requirements relating to site activities including: (discuss/review)	☐	☐	☐	☐	☐
14.	Drilling/boring	☐	☐	☐	☐	☐
15.	UST	☐	☐	☐	☐	☐
16.	Excavations (including UG utility locations)	☐	☐	☐	☐	☐
17.	Heavy equipment	☐	☐	☐	☐	☐
18.	Slips, trips, and falls	☐	☐	☐	☐	☐
19.	Lockout/tagout	☐	☐	☐	☐	☐
20.	Working in temperature extremes	☐	☐	☐	☐	☐
21.	Rain or other weather advisories	☐	☐	☐	☐	☐
22.	Other health & safety issues (discuss/note)	☐	☐	☐	☐	☐

I have participated in the daily safety meeting discussing the topics indicated and fully understand my responsibility for complying with all health and safety requirements. I have had the opportunity to have my questions on site health and safety issues and procedures answered.

Employee Name	**Employee Signature**	**Date**

PPE Selection Guidelines

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

- **Safety glasses** – general eye protection – source of hazard, typically coming from straight on, required at most sites
- **Tinted Safety Glasses** – same as above, but when working in direct sunlight. May need two both tinted and untinted if working in both sunlight and shade/overcast skys.
- **Safety goggles** – needed for splash hazard, more severe eye exposures coming from all directions. Non-vented or indirect venting for chemical splash, non-vented for hazardous gases or very fine dust, vented for larger particulates coming from all directions.
- **Face shield** – needed to protect face from cuts, burns, chemicals (corrosives or chemicals with skin notation), etc.
- **Safety boots** – needed if danger of items being dropped on foot that could injure foot
- **Hard hat** – danger from items falling on head – any overhead work, tools, equipment, etc that is above the head and could fall on head of item fails, or falls off work platform. Typically required at most sites as a general PPE
- **Thin, chemical protective inner gloves** (e.g., thin Nitrile, PVC – do not use latex – many people are allergic to latex) –needed to protect hands from incidental contact with low risk contamination at very low concentrations (ppb or low ppm concentrations in groundwater or soil) or used in combination with outer gloves as a last defense against contamination. Need to specify type
- **Outer gloves** – thicker gloves (e.g., Nitrile, Butyl, Viton, etc.) – used when potential for high concentrations of contaminants (e.g., floating product, percent ranges of contaminant, opening drums, handling pure undiluted chemicals, etc.). Need to specify type.
- **Leather gloves, leather palm, cotton** – good in protecting hands against cuts – no protection from chemicals. May be used in combination with chemical protective gloves.
- **Boot Covers –** when there is contamination in surface soils or waking surface in general. When safety boots need protection from contact with contaminants.
- **White (uncoated) Tyveks** – protect clothing from getting dirty, good for protection against solid, non-volatile chemicals (e.g., asbestos, metals) – no chemical protection.
- **Polycoated Tyveks** – least protective of chemical protective clothing. Used when some risk of contamination getting on skin or clothing. Usually, lower ppm ranges of contaminants.
- **Saranex** – Greater protection against contamination than Polycoated Tyveks. Used to protect against PCBs or higher concentrations of contaminants in the soil or groundwater.
- **Other Chemical protective clothing** – if significant risk of dermal exposure, contact H&S to determine best kind.
- **Long sleeved shirts, long pants** – if working in areas with poison ivy/oak/sumac, poisonous insects, etc. and no chemicals exposure. May want to use uncoated Tyveks for work in areas where poisonous plants are know to be to protect clothing.
- **Cartridge Respirator (Level C PPE)** – Need to calculate change schedule (contact Division EH&S Manager for this) to determine length of use. To be able to use cartridge respirators, need to know contaminants, estimate levels to be encountered in the breathing zone, need to ensure that cartridge will be effective against COCs, and need to be able to monitor for COCs using PID, FID, Dräger tubes, etc.. If can't do any of these, then Level B PPE is probably going to be needed.
- **High Visibility Vest** – needed for any road work (with in 15 feet of a road) or when working on a site with vehicular traffic or working around heavy equipment. Needed if work tasks would take employee concentration away from movement of vehicles and workers would have to rely on the other driver's ability to see the employee in order not to hit them. This includes heavy equipment as well as cars and trucks, on public roads or the jobsite. Not needed if wearing Polycoated Tyveks – as they are already high visibility.
- **Reflective Vest** – see above, but for use at night.
- **Hearing Protection** – needed if working at noise levels above 85 dBA on a time weighted average. If noise measurements are not available, use around noisy equipment, or in general, if you have to raise your voice to be heard when talking to someone standing two feet away.
- **Protective Chaps –** required when using a machete or chain saw or any other cut hazard to legs.

Check one
Initial Report: ☐
Update: ☐

Category C: ☐
Category B: ☐
Category A: ☐

ATTACHMENT 1
INCIDENT ANALYSIS REPORT
Attorney-Client Work Product Prepared in Anticipation of Litigation
(Review instructions on page 9 prior to completing this form)

Local Office ID Number: _____

To: Office of the General Counsel
This information has been prepared at your request and under your direction in anticipation of litigation so that you may prove appropriate legal advice to the undersigned and the management of the Company.

Section 1 – General Information

Report Date:_____ Incident Date:_____ Time of incident: _____

Employee Name: _____ Sex: ☐ M ☐ F

Job Title: _____ Hire Date: _____ Time employee began work: _____

Department: _____ Project Manager: _____ Client: _____

Office where employee works from: _ Immediate Supervisor: _____ Hours employee worked during last 7 days: _____ hr

Location where incident occurred: _____ Is this a Company controlled work site: ☐ Yes ☐ No

Section 2 – Incident Type (mark all that apply)

A. Type of incident being reported:

☐ Near Miss ☐ First-aid Case ☐ Medical Treatment ☐ Hospitalization ☐ Day Away Case ☐ Restricted/Transfer Case

☐ Fatality ☐ Vehicle Incident ☐ Notice of Violation ☐ Regulatory Inspection ☐ Environmental Release

☐ Other (please describe): _____

B. If an **injury or illness** - describe the part of the body that was affected and how it was affected:

C. If an **environmental release** - describe the quantity and name and CAS# of material released into the environment:

D. If an **inspection by a regulatory agency** - what agency, who were the inspectors, and supply inspector contact information:

Section 3 – Incident Description (Attach and number additional pages, as needed, to ensure **all details related to the incident are captured.**)

A. List the names of all persons involved in the incident, and employer information:

B. List the names of any witnesses, their employer, and a local/company telephone number or address:

C. What was the employee(s) doing just prior to the incident?

D. Explain in **detail** what happened?

E. Explain in **detail** what object or substance directly harmed the employee?

F. List any damaged equipment or property (other than motor vehicles) model and serial number **and** estimated costs to repair/replace damaged equipment or property, if applicable:

Section 4 - Incident Analysis

A. Was a Job Hazard Analysis (JHA) completed for the work being performed? YES ☐ NO ☐ Who prepared the JHA?

B. When and who was the last safety officer (i.e. LHSR, supervisor, Division ES&H Manager, etc.) at your work site?

C. When and what safety training **directly related** to the incident has the person(s) involved had?

Section 5 - Incident Investigation Results

#	**Causal Factors** (Attach and number any additional pages as needed to completely address this section)
1	
2	
3	
4	
5	

Root Cause(s) Analysis (The below items represent major root cause categories which have been determined to be Less Than Adequate (LTA). A more detailed determination of the root cause will be facilitated, if needed, by your Division's ES&H Manager.)

1. Equipment Reliability Program Implementation	5. Training
2. Administrative / Management Systems	6. Immediate Supervision
3. Procedures	7. Communications
4. Human Factors Engineering	8. Personal Performance

Root Cause #	**Corrective Actions to be taken** (Attach additional pages as needed to completely address this section)	**Responsible Person**	**Proposed Completion Date**	**Closed on Date**	**Verified by and Date Verified**

Section 6 – Notifications, Certification & Approvals

Check the appropriate boxes indicating the applicable reports have been made to the following organizations:

Auto Lessor ☐ **Insurer** ☐ **Workers' Compensation Administrator** ☐

Post-incident Substance Abuse Testing Has Been Performed ☐

Incident investigated by (signatures):	
Employee(s): **Date:**	Employee's Supervisor: Date:
LHSR/Project/Office Manager: Date:	Division ES&H Manager: Date:

VEHICLE INCIDENT REPORT

Attorney-Client Work Product Prepared in Anticipation of Litigation

(Review instructions on page 12 prior to completing this form)

Section 1 - General Information

Date of incident: _____

Time incident occurred: __ ☐ AM ☐ PM Illumination: ☐ Dark ☐ Light Road Condition: ☐ Dry ☐ Wet ☐ Icy/snow

Were police summoned to scene? ☐ Yes ☐ No Police Department and Location: _____

Report #: _____ Officer's Name and Badge Number: _____

Section 2 - Company Driver and Vehicle

Driver's name: _____ D/L # _____ State: _____

Driver's home office address: _____ Driver's Phone # _____

Company Vehicle # _____ Year ____ Model _____ License # _____ State _____

Company car? ☐ Yes ☐ No Owned by employee? ☐ Yes ☐ No

Leased/rented from _____

Passenger/Witness Name(s) _____ Address: _____ Phone: _____

Passenger/Witness Name(s) _____ Address: _____ Phone: _____

Passenger/Witness Name(s) _____ Address: _____ Phone: _____

Damage to vehicle: _____

Injuries to employee(s): _____

Injuries to others: _____

Vehicle was being used for: Company business ☐ Yes ☐ No Personal business ☐ Yes ☐ No

Towed: ☐ Yes ☐ No By Whom: _____ To Where: _____

Section 3 - Other Driver and Vehicle Information

Driver's Name: _____ D/L # _____ State _____

Current Address _____ City _____ State _____

Telephone Home: _____ Work: _____ Cell: _____

Reg. Owner's Name: _____ Address: _____ City: _____ State: _____
(verify registration document)

The Other Vehicle: Make _____ Model _____ Year _____ License # _____ State _____

Insurance company name: _____ Address: _____ Phone # _____

Policy No. _____ Contact Person _____ Phone # _____

Passenger/Witness Name(s) _____ Address: _____ Phone: _____

Passenger/Witness Name(s) _____ Address: _____ Phone: _____

Damage: (*Make note of pre-existing damage and take pictures if possible. **Attach additional pages as needed**)*

Injuries to other driver/passengers:

Section 4 – Approvals (signatures required)

Form completed by: _____ Signature: _____ Date: _____

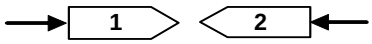
Things to Do First In The Event Of a Motor Vehicle Incident

1. Most important: **STOP.**
2. **Call 911 if there are injuries.**
3. Call for an officer if the incident occurred on public property (streets, highways or roads). Disputes often arise between the parties involved as to who was at fault; therefore, a police report is important. If an officer is unable to attend the scene of the accident, a counter police report may be filed at most stations. Insurance companies rely on police reports to determine liability.
4. Complete the Incident Investigation Report and the Vehicle Incident Report forms. It is important that both these forms are completed in detail. Include a diagram of the incident on the back of the report. Incomplete information may lead to delays in processing associated claims and in helping to prevent this type of incident from occurring again.
5. Express no opinion as to who was at fault. This is for the insurance companies to determine.

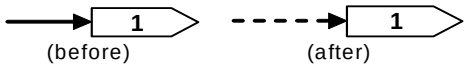
6. Give only information that is required by the authorities or as directed by MACTEC contractual requirements.
7. Sign only those statements required by the authorities or as directed by MACTEC contractual requirements. Do not sign away your rights or the company's rights.
8. If you are injured or think you were injured, tell your supervisor and see a physician. Your supervisor will notify MACTEC's Worker's Compensation insurance carrier, your Division's ES&H Manager and the Corporate Director of ES&H by phone, email or fax. For additional instructions on what to do, go to MACTEC's ES&H website on the intranet at:

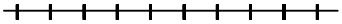
   http://intranet.mactec.com/EnvSafetyHealth/HealthSafety_Claims_Reporting.htm
9. Your supervisor will forward both completed incident reports immediately to **y**our Division's ES&H Manager.

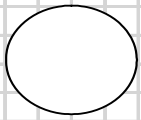
Instructions:

1. Number each vehicle and show directions 

2. Use a solid line to show path before incident and use a dotted line to show path after incient



3. Show pedestrian/non-motorist by: 
4. Show railroad by: 
5. Indicate north by arrow as: 
6. Show street or highway names or numbers
7. Show signs, signals, warning and traffic controls.



Indicate North
by Arrow

Prepared by: _____ Date: _____

ATTACHMENT A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name: Tetrachloroethene

CAS Number: 127-18-4

Synonyms: tetrachloroethylene; Perchloroethylene (Perc

HEALTH HAZARD DATA

Color:	colorless
Physical State: Solid	
Liquid	X
Gas	
Odor:	chloroform-like
Odor Threshold:	47 ppm
Vapor Density	6.8 g/L
Ionization Potential (IP)	9.32 eV
IDLH:	150 ppm

Carcinogen:	OSHA	
	IARC	
	NTP	X
	ACGIH	X
	NIOSH	X
Skin absorbable	yes __	no X
Skin corrosive	yes __	no X

Signs/Symptoms of Acute Exposure

Irritation of eyes, nose, and throat; nausea; flushing of the face and neck; vertigo; dizziness; incoherence; headache; sleepiness, and skin irritation

Source	TWA (units)	STEL (units)	C (units)
OSHA PEL	100 ppm		200 ppm
ACGIH TLVs	25 ppm	100 ppm	
NIOSH RELs	Lowest Feasible		

AIR MONITORING

Type	Brand/Mode No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
PID	Microtip 10.6 eV	Isobutylene 100 ppm	1.04 ppm	26 ppm
PID	HNu 10.2 eV	Isobutylene 100 ppm	0.86	21.5 ppm
Detecor Tube	Drager 8101 501	2 - 40 ppm		25 ppm

Checked by: Emmet F. Curtis Date: 12/5/03

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials

Suits	Teflon, Viton, CPF3, Barricade, Responder, Trellchem, Tychem
Gloves	Viton, Teflon, and Polyvinyl Alcohol (do not use in (water)
Boots	Nitrile Rubber

Service Limit Concentration (ppm): 1000

MUC 1/2 Mask APR=TWA x 10= 125 ppm

MUC Full-Face APR=TWA x 10= 125 ppm

FIRE/REACTIVITY DATA

Flash Point: NA

LEL/UEL: NA / NA

Fire Extinguishing Media

Dry Chemical	X	Foam	X
Water Spray	X	CO_2	X

Incompatibilities

Strong oxidizers, chemically-active metals; caustic soda, sodium hydroxide, and potas

Note: The recommended protective clothing materials assumes that potential for direct contact (by splashing, dust inhalation, or other means) with the contaminants exists. Professional judgment and knowledge of on-site hazards should be used in selecting PPE appropriate to the concentration of the contaminant (trace vs percentage) to which the individual is likely to be exposed.

ATTACHMENT A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name: Trichloroethene
CAS Number: 79-01-6
Synonyms: Ethylene trichloride, TCE, Trichloroethylene, Trilene

HEALTH HAZARD DATA

Color:	Colorless
Physical State: Solid	
Liquid	X
Gas	
Odor:	Chloroform-like
Odor Threshold:	82 ppm
Vapor Density	4.5 g/L
Ionization Potential (IP)	9.45 eV
IDLH:	1000 ppm

Carcinogen: OSHA	
IARC	
NTP	
ACGIH	
NIOSH	X
Skin absorbable	yes ___ no X
Skin corrosive	yes ___ no X

Signs/Symptoms of Acute Exposure
Irritant to eyes and skin, headach
nausea, vomiting, dermatitis, vertigo
visual disturbance, fatigue, giddiness
sleepiness

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	100 ppm		200 ppm
ACGIH TLVs	10 ppm	100 ppm	
NIOSH RELs	25 ppm		

AIR MONITORING

Type	Brand/Mode No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
PID	Microtip 10.6eV	Isobutylene 100 ppm	0.92	23
PID	HNu 10.2eV	Isobutylene 100 ppm	0.90	22.5
Detector Tube	Drager 6828541	2 - 50 ppm		25

Checked by: Emmet F. Curtis Date: 12/5/03

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials

Suits	Viton, PE/EVAL, Tychem,
	Barricade, Trellchem
	Teflon, Responder
Gloves	Viton, Teflon
	Polyvinyl alcohol (do not
	use in water)
Boots	Teflon, Viton

Service Limit Concentration (ppm) 1000

MUC 1/2 Mask APR = TWA x 10 = 250 ppm
MUC Full-Face APR = TWA x 10 = 250 ppm

FIRE/REACTIVITY DATA

Flash Point: Unknown

LEL/UEL: 8% / 10.5%

Fire Extinguishing Media

Dry Chemical	X	Alcohol resistant	
Foam	X	Water Spray	X
CO_2	X		

Incompatibilities
Strong caustics and alkalis, chemically active metals (such as barium, lithium, sodium, magnesium, titanium, and beryllium

Note: The recommended protective clothing materials assumes that potential for direct contact (by splashing, dust inhalation, or other means) with the contaminant exists. Professional judgement and knowledge of on-site hazards should be used in selecting PPE appropriate to the concentration of the contaminant (trace vs percentage) to which the individual is likely to be exposed.

ATTACHMENT A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name
1,1,1-Trichloroethane

CAS Number: 71-55-6

Synonyms
Methyl chloroform; chlorothene

HEALTH HAZARD DATA

Color: Colorless

Physical State: Solid ; Liquid X ; Gas

Odor: Chloroform-like

Odor Threshold: 100 ppm

Vapor Density: 5.5 g/L

Ionization Potential (IP): 11.00 eV

IDLH: 700 ppm

Carcinogen: OSHA ; IARC ; NTP ; ACGIH ; NIOSH

Skin absorbable: yes __ no X

Skin corrosive: yes X no ___

Signs/Symptoms of Acute Exposure
Skin irritation, headaches, dizziness
nausea, vomiting, diarrhea

Source	TWA (units)	STEL (units)	C (units)
OSHA PEL	350 ppm		
ACGIH TLVs	350 ppm	450 ppm	
NIOSH RELs			350 ppm

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
PID	HNU 11.7eV	Isobutylene 100 ppm	0.48	168

Checked by: Emmet F. Curtis Date: 12/5/03

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials

Suits: Tychem, Teflon, Vitor

Gloves: Teflon, Viton, PE/EVAL; Polyvinyl alchohol (D; not use in water

Boots: Teflon, Viton

Service Limit Concentration (ppm): NA

MUC 1/2 Mask APR=TWA x 10= 700 ppm
MUC Full-Face APR=TWA x 10= 700 ppm

FIRE/REACTIVITY DATA

Flash Point: NA

LEL/UEL: 7.5% / 12.5%

Fire Extinguishing Media

Dry Chemical	X	Foam	X
Water Spray		CO_2	X

Incompatibilities
Strong caustics; strong oxidizers; chemicall
active metals such as: zinc, aluminum
magnesium powders, sodium, an
potassium; wate

Note: The recommended protective clothing materials assumes that potential for direct contact (by splashing, dust inhalation, or other means) with the contaminants exists. Professional judgment and knowledge of on-site hazards should be used in selecting PPE appropriate to the concentration of the contaminant (trace vs percentage) to which the individual is likely to be exposed.

ATTACHMENT A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name
1,1-Dichloroethene
CAS Number: 75-35-4
Synonyms
Vinylidene chloride
1,1-Dichloroethylene (1,1-DCE

HEALTH HAZARD DATA

Color: colorless

Physical State: Solid; Liquid: X; Gas: X (above 89°F)

Odor: chloroform-like

Odor Threshold: 190ppm

Vapor Density: 4.0 g/L

Ionization Potential (IP): 10.00 eV

IDLH: unknown
1,2-DCE: 1000 ppm

Carcinogen: OSHA; IARC; NTP; ACGIH; NIOSH: X

Skin absorbable: yes __ no X

Skin corrosive: yes __ no X

Signs/Symptoms of Acute Exposure
Irritation of skin and eyes, dizziness
headache, nausea, drunkenes
and anesthesia

	Source	TWA (units)	STEL (units)	C (units)
OSHA PEL				
ACGIH TLVs		5 ppm		
NIOSH RELs		Lowest Feasible		

AIR MONITORING

Type	Brand/Mode No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
PID	Microtip 10.6 eV	Isobutylene 100 ppm	0.99	4.95
PID	HNu 10.2 eV	Isobutylene 100 ppm	0.64	3.2

Checked by: Emmet F. Curtis Date: 12/5/03

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials

Suits: Teflon

Gloves: Teflon, Polyvinyl Alcoho
(do not use in water

Boots: Teflon

Service Limit Concentration (ppm): 1000

MUC 1/2 Mask APR=TWA x 10= 25 ppm
MUC Full-Face APR=TWA x 10= 25 ppm

FIRE/REACTIVITY DATA

Flash Point: (-2°)F

LEL/UEL: 6.5%/15.5%

Fire Extinguishing Media
Dry Chemical: X; Foam: X
Water Spray: ___; CO_2: X

Incompatibilities
Aluminum, sunlight, air, copper, heat

Note: The recommended protective clothing materials assumes that potential for direct contact (by splashing, dust inhalation, or other means) with the contaminants exists. Professional judgment and knowledge of on-site hazards should be used in selecting PPE appropriate to the concentration of the contaminant (trace vs percentage) to which the individual is likely to be exposed.

ATTACHMENT A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name
1,1-Dichloroethane (11DCA
CAS Number: 75-34-3
Synonyms
Ethylidene chloride
1,1-Ethylidene chloride
Asymmetrical dichloroethane

HEALTH HAZARD DATA

Color: colorless

Physical State: Solid ; Liquid X ; Gas

Odor: chloroform-like

Odor Threshold: 120 ppm

Vapor Density: 4.0 g/L

Ionization Potential (IP): 11.06 eV

IDLH: 3000 ppm

Carcinogen: OSHA ; IARC ; NTP ; ACGIH ; NIOSH

Skin absorbable: yes __ no _X_

Skin corrosive: yes __ no _X_

Signs/Symptoms of Acute Exposure
Central nervous system depression
skin irritation, lung damage

Source	TWA (units)	STEL (units)	C (units)
OSHA PEL	100 ppm		
ACGIH TLVs	100 ppm		
NIOSH RELs	100 ppm		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
PID	Micro tip 11.7 eV	Isobutylene 100 ppm	0.04	4

Checked by: Emmet F. Curtis Date: 12/5/03

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits: Tychem

Gloves: Viton ; Polyvinyl Alcoho ; (do not use in water

Boots: Viton

Service Limit Concentration (ppm): 1000

MUC 1/2 Mask APR=TWA x 10= 500 ppm
MUC Full-Face APR=TWA x 10= 500 ppm

FIRE/REACTIVITY DATA

Flash Point: 2°F

LEL/UEL: 5.4%/11.4%

Fire Extinguishing Media
Dry Chemical X ; Foam X
Water Spray ___ ; CO_2 X

Incompatibilities
Strong oxidizers and strong caustics

Note: The recommended protective clothing materials assumes that potential for direct contact (by splashing, dust inhalation, or other means) with the contaminants exists. Professional judgment and knowledge of on-site hazards should be used in selecting PPE appropriate to the concentration of the contaminant (trace vs percentage) to which the individual is likely to be exposed.

ATTACHMENT A

CONTAMINANT FACT SHEET

CONTAMINANT FACT SHEET

Chemical Name:
Vinyl Chloride

CAS Number: 75-01-4

Synonyms:
Chloroethene, chloroethylene, ethylene monochloride, VC, monochloroethene

HEALTH HAZARD DATA

Color: Colorless

Physical State: Solid
Liquid X below 7^0 F
Gas X

Odor: pleasant

Odor Threshold: 10-20 ppm

Vapor Density: 2.15 g/L
Vapor Pressure 3.3 atm
Ionization Potential (IP): 9.99 eV

IDLH: Not Determined

Carcinogen: OSHA X
IARC X
NTP X
ACGIH X
NIOSH X

Skin absorbable: yes ___ no X
Skin corrosive: yes ___ no X

Signs/Symptoms of Acute Exposure:
Weakness, abdominal pain, frostbite paleness or blueness of extremeties

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	1.0 ppm		5.0 ppm
ACGIH TLVs	1.0 ppm		
NIOSH RELs	Lowest Feasible		

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
PID	10.6eV	Isobutylene 100 ppm	0.51	0.5 ppm*
PID	HNu 10.2eV	Isobutylene 100 ppm	0.32	0.32 ppm*
PID	HNu 11.7 eV	Isobutylene 100 ppm	0.78	0.78 ppm*
Detector Tube	Drager 6728061	0.5 - 3 ppm		0.5 ppm

Checked by: Cindy Sundquist Date: 4/19/10

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:
Suits: Tychem, Teflon
Gloves: Teflon, Tychem; Nitrile Rubber
Boots: Nitrile Rubber, Teflon

Service Limit Concentration (ppm): N/A

MUC 1/2 Mask APR = TWA x 10 = N/A*
MUC Full-Face APR = TWA x 10 = N/A*

* Upgrade to Level B ppe. No Level C.

FIRE/REACTIVITY DATA

Flash Point: NA

LEL/UEL: 3.6% / 33%

Fire Extinguishing Media:
Dry Chemical X Foam X
Water Spray X CO_2 X

Incompatibilities:
Copper, oxidizers, aluminum, peroxides, iron, steel (polymerizes in air, sunlight, or heat unless stabilized by inhibitors). Attacks iron and steel in presence of moisture.

Note: The recommended protective clothing materials assumes that potential for direct contact (by splashing, dust inhalation, or other means) with the contaminant exists. Professional judgement and knowledge of on-site hazards should be used in selecting PPE appropriate to the concentration of the contaminant (trace vs percentage) to which the individual is likely to be exposed.

MACTEC

Job Hazard Analysis – HASP Format

Job Title: Mobilization/Demobilization and Site Preparation **Date of Analysis:** 8/15/06

Minimum Recommended PPE*: High visibility vest, hard hat, steel-toed boots, safety glasses, hearing protection
*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Prepare for Site Visit	1A) N/A	1A) Prior to leaving for site ▪ Obtain and review HASP prior to site visit, if possible ▪ Determine PPE needs – bring required PPE to the site, if not otherwise being provided at the site (e.g., steel toed boots) ▪ Determine training and medical monitoring needs and ensure all required Health and Safety training and medical monitoring has been received and is current ▪ Ensure all workers are fit for duty (alert, well rested, and mentally and physically fit to perform work assignment) ▪ If respiratory protection is required/potentially required, ensure that training and fit-testing has occurred within the past year. ▪ Familiarize yourself with route to the site
	1B) Vehicle defects	1B) Inspect company owned/leased vehicle for defects such as: ▪ Flat tires ▪ Windshield wipers worn or torn ▪ Oil puddles under vehicle ▪ Headlights, brake lights, turn signals not working
	1C) Insufficient emergency equipment, unsecured loads	1C) Insufficient emergency equipment, unsecured loads ▪ Ensure vehicle has first aid kit and that all medications are current (if first aid kits are not provided at the site) ▪ Ensure vehicle is equpped with warning flashers and/or flares and that the warning flashers work ▪ Cell phones are recommended to call for help in the event of an emergency ▪ Vehicles carrying tools must have a safety cage in place. All tools must be properly secured ▪ Vehicles must be equipped with chocks if the vehicle is to be left running, unattended. ▪ Ensure sufficient gasoline is in the tank
2. Operating vehicles – general	2A) Collisions, unsafe driving conditions	2A) Drive Defensively! ▪ Seat belts must be used at all times when operating any vehicle on company business. ▪ Drive at safe speed for road conditions ▪ Maintain adequate following distance ▪ Pull over and stop if you have to look at a map ▪ Try to park so that you don't have to back up to leave. ▪ If backing in required, walk around vehicle to identify any hazards (especially low level hazards that may be difficult to see when in the vehicle) that might be present. Use a spotter if necessary
3. Driving to the jobsite	3A) Dusty, winding, narrow roads	3A) Dusty, winding, narrow roads ▪ Drive confidently and defensively at all times. ▪ Go slow around corners, occasionally clearing the windshield.
	3B) Rocky or one-lane roads	3B) Rocky or one-lane roads ▪ Stay clear of gullies and trenches, drive slowly over rocks. ▪ Yield right-of-way to oncoming vehicles---find a safe place to pull over.
	3C) Stormy weather, near confused tourists	3C) Stormy weather, near confused tourists ▪ Inquire about conditions before leaving the office. ▪ Be aware of oncoming storms. ▪ Drive to avoid accident situations created by the mistakes of others.

MACTEC

Job Hazard Analysis – HASP Format

Job Title: Mobilization/Demobilization and Site Preparation **Date of Analysis:** 8/15/06

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3D) When angry or irritated	3D) When angry or irritated ▪ Attitude adjustment; change the subject or work out the problem before driving the vehicle. Let someone else drive.
	3E) Turning around on narrow roads	3E) Turning around on narrow roads ▪ Safely turn out with as much room as possible. ▪ Know what is ahead and behind the vehicle. ▪ Use a backer if available.
	3F) Sick or medicated	3F) Sick or medicated ▪ Let others on the crew know you do not feel well. ▪ Let someone else drive.
	3G) On wet or slimy roads	3G) On wet or slimy roads ▪ Drive slow and safe, wear seatbelts.
	3H) Animals on road	3H) Animals on road ▪ Drive slowly, watch for other animals nearby. ▪ Be alert for animals darting out of wooded areas
4. Gain permission to enter site	4A) Hostile landowner, livestock, pets	4A) Hostile landowner, livestock, pets ▪ Talk to land owner, be courteous and diplomatic ▪ Ensure all animals have been secured away from work area
5. Mobilization/ Demobilization of Equipment and Supplies	5A) Struck by Heavy Equipment/Vehicles	5A) Struck by heavy equipment ▪ Be aware of heavy equipment operations. ▪ Keep out of the swing radius of heavy equipment. ▪ Ground personnel in the vicinity of heavy equipment operations will be within the view of the operator at all times ▪ Employees shall wear a high visibility vest or T-shirt (reflective vest required if working at night). ▪ Ground personnel will be aware of the counterweight swing and maintain an adequate buffer zone. ▪ Ground personnel will not stand directly behind heavy equipment when it is in operation.
	5B) Struck by Equipment/Supplies	5B) Struck by Equipment/Supplies ▪ Workers will maintain proper space around their work area, if someone enters it, stop work. ▪ When entering another worker's work space, give a verbal warning so they know you are there.
	5C) Overexertion Unloading/Loading Supplies	5C) Overexertion Unloading/Loading Supplies ▪ Train workers on proper body mechanics, do not bend or twist at the waist while exerting force or lifting. ▪ Tightly secure all loads to the truck bed to avoid load shifting while in transit.
	5D) Caught in/on/between	5D) Caught in/on/between ▪ Do not place yourself between two vehicles or between a vehicle and a fixed object.
	5E) Slip/Trip/Fall	5E) 1E). Slip/Trip/Fall ▪ Mark all holes and low spots in area with banner tape. Instruct personnel to avoid these areas. ▪ Drivers will maintain 3 point contact when mounting/dismounting vehicles/equipment. ▪ Drivers will check surface before stepping, not jumping down.

MACTEC

Job Hazard Analysis – HASP Format

Job Title: Mobilization/Demobilization and Site Preparation **Date of Analysis:** 8/15/06

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	5F) Vehicle accident	5F) Vehicle accident ▪ Employees should follow MACTEC vehicle operation policy and be aware of all stationary and mobile vehicles.
6. Site Preparation	6A) Slip/Trip/Fall	6A) Slip/Trip/Fall ▪ Mark all holes and low spots in area with banner tape. Instruct personnel to avoid these areas
7. Installation of soil erosion and sediment controls	7A) Overexertion	7A) Overexertion ▪ Workers will be trained in the proper method of placing erosion controls. ▪ Do not bend and twist at the waist while lifting or exerting force.
	7B) Struck by Equipment/Supplies	7C) Struck by Equipment/Supplies ▪ Workers will maintain proper space around their work area, if someone enters it, stop work. ▪ When entering another worker's work space, give a verbal warning so they know you are there.
8. Driving back from the jobsite	8A) See hazards listed under item #3	8A) See safe work practices under item #3

MACTEC

Job Hazard Analysis – HASP Format

Job Title: Field Work - General **Date of Analysis:** 8/15/06

Minimum Recommended PPE*: hard hat, steel-toed boots, safety glasses
*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Mobilization/ Demobilization and Site Preparation	1A) See Mobilization/Demobilization and Site Preparation JHA	1A) See Mobilization/Demobilization and Site Preparation JHA
2. Communication	2A) Safety, crew unity	2A) Talk to each other. ▪ Log all workers and visitor on and off the site. ▪ Let other crewmembers know when you see a hazard. ▪ Avoid working near known hazards. ▪ Always know the wherabouts of fellow crewmembers. ▪ Carry a radio and spare batteries or cell phone ▪ Review Emergency Evacuation Procedures (see below).
3. Walking and working in the field	3A) Falling down, twisted ankles and knees, poor footing	3A) Always watch your footing. ▪ Horseplay is strictly prohibited ▪ Slow down and use extra caution around logs, rocks, and animal holes. ▪ Extremely steep slopes (>50%) can be hazardous under wet or dry conditions; consider an alternate route. ▪ Wear laced boots with a minimum 8" high upper and non-skid Vibram-type soles for ankle support and traction.
	3B) Falling objects	3B) Protect head agains falling objects. ▪ Wear your hardhat for protection from falling limbs and pinecones, and from tools and equipment carried by other crewmembers. ▪ Stay out of the woods during extremely high winds.
	3C) Chemical/Toxicological Hazards	3C) Chemical/Toxicological Hazards ▪ See HASP for appropriate level of PPE ▪ Use monitoring equipment, as outlined in HASP, to monitor breathing zone ▪ Read MSDSs for all chemicals brought to the site ▪ Be familiar with hazards associated with site contaminants. ▪ Ensure that all containers are properly labelled ▪ Decon thoroughly prior to consumption of food, beverage or tobacco.
	3D) Damage to eyes	3D) Protect eyes: ▪ Watch where you walk, ecpecially around trees and brush with limbs sticking out. ▪ Exercise caution when clearing limbs from tree trunks. Advise wearing eye protection. ▪ Ultraviolet light from the sun can be damaging to the eyes; look for sunglasses that specify significant protection from UV-A and UV-B radiation. If safety glasses require, use one's with tinted lenses
	3E) Bee and wasp stings	3E) See JHA for Insect Stings and Bites
	3F) Ticks and infected mosquitos	3F) See JHA for Insect Stings and Bites
	3G) Wild Animals	3G) Wild Animals ▪ Avoid phyisical contact with wild animals ▪ Do not threaten and/or conrner animals ▪ Make noise to get the animal to retreat. ▪ Stay in or return to vehicle/equipment if in danger

MACTEC

Job Hazard Analysis – HASP Format

Job Title: Field Work - General **Date of Analysis:** 8/15/06

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3H) Contact with poisonous plants or the oil from those plants:	3H) Contact with poisonous plants or the oil from those plants: ▪ Look for signs of poisonous plants and avoid. ▪ Ensure all field workers can identify the plants. Mark identified poisonous plants with spray paint if working at a fixed location. ▪ Do not allow plant to touch any part of your body/clothing. ▪ Wear PPE as described in the HASP and wear Tyveks, gloves and boot covers if contact with plant is likely ▪ Always wash gloves before removing them. ▪ Discard PPE in accordance with the HASP. ▪ Use commercially available products such as Ivy Block or Ivy Wash as appropriate.
		 POISON IVY (Rhus toxicondendron L.) POISON OAK (Rhus diversiloba) POISON SUMAC (Rhus toxicondendron vernix)
	3I) Back Injuries	3I) Back Injuries ▪ Site personnel will be instructed on proper lifting techniques. ▪ Mechanical devices should be used to reduce manual handling of materials. ▪ Split heavy loads in to smaller loads ▪ Team lifting should be utilized if mechanical devices are not available. ▪ Make sure that path is clear prior to lift.
	3J) Shoveling	3J) Shoveling ▪ Select the proper shovel for the task. A long handled, flat bladed shovel is recommend for loose material ▪ Inspect the handle for splinters and/or cracks ▪ Ensure that the blade is securely attached to the handle ▪ Never be more than 15 inches from the material you are shoveling ▪ Stand with your feet about hip width for balance and keep the shovel close to your body. ▪ Bend from the knees (not the back) and tighten your stomach muscles as you lift. ▪ Avoid twisting movements. If you need to move the snow to one side reposition your feet to face the direction the snow will be going. ▪ Avoid lifting large shoveling too much at once. When lifting heavy material, pick up less to reduce the weight lifted. ▪ Pace yourself to avoid getting out of breath and becoming fatigued too soon. ▪ Be alert for signs of stress such as pain, numbness, burning and tingling. Stop immediately if you feel any of these symptoms.
	3K) Slips/Trips/Falls	3K) Slips/Trips/Falls ▪ Maintain work areas safe and orderly; unloading areas should be on even terrain; mark or repair possible tripping hazards. ▪ Site SHSO inspect the entire work area to identify and mark hazards. ▪ Maintain three points of contact when climbing ladders or onto/off of equipment

MACTEC

Job Hazard Analysis – HASP Format

Job Title: Field Work - General **Date of Analysis:** 8/15/06

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3L) Overhead Hazards	3L) Overhead Hazards ▪ Personnel will be required to wear hard hats that meet ANSI Standard Z89.1. ▪ All ground personnel will stay clear of suspended loads. ▪ All equipment will be provided with guards, canopies or grills to protect the operator from falling or flying objects. ▪ All overhead hazards will be identified prior to commencing work operations.
	3M) Dropped Objects	3M) Dropped Objects ▪ Steel toe boots meeting ANSI Standard Z41 will be worn.
	3N) Noise	3N) Noise ▪ Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs); all equipment will be equipped with manufacturer's required mufflers. Hearing protection shall be worn by all personnel working in or near heavy equipment.
	3O) Eye Injuries	3O) Eye Injuries ▪ Safety glasses meeting ANSI Standard Z87 will be worn.
	3P) Heavy Equipment (overhead hazards, spills, struck by or against)	3P) Heavy Equipment ▪ All operators will be trained and qualified to operate equipment ▪ Equipment will have seat belts. ▪ Operators will wear seat belts when operating equipment. ▪ Do not operate equipment on grades that exceed manufacturer's recommendations. ▪ Equipment will have guards, canopies or grills to protect from flying objects. ▪ Ground personnel will stay clear of all suspended loads. ▪ Personel are prohibited from riding on the buckets, or elsewhere on the equipment except for designated seats with proper seat belts or lifts specifically designed to carry workers. ▪ Ground personnel will wear high visibility vests ▪ Spill and absorbent materials will be readily available. ▪ Drip pans, polyethylene sheeting or other means will be used for secondary containment. ▪ Ground personnel will stay out of the swing radius of excavators. ▪ Eye contact with operators will be made before approaching equipment. ▪ Operator will acknowledge eye contact by removing his hands from the controls. ▪ Equipment will not be approached on blind sides. ▪ All equipment will be equipped with backup alarms and use spotters when significant physical movement of equipment occurs on-site, (i.e., other than in place excavation or truck loading). ▪ Inspect rigging prior to each use.

MACTEC

Job Hazard Analysis – HASP Format

Job Title: Field Work - General **Date of Analysis:** 8/15/06

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3Q) Struck by vehicle/equipment	3Q) Struck by vehicle/equipment ▪ Be aware of heavy equipment operations. ▪ Keep out of the swing radius of heavy equipment. ▪ Ground personnel in the vicinity of vehicles or heavy equipment operations will be within the view of the operator at all times. ▪ Ground personnel will be aware of the counterweight swing and maintain an adequate buffer zone. ▪ Ground personnel will not stand directly behind heavy equipment when it is in operation. ▪ Drivers will keep workers on foot in their vision at all times, if you lose sight of someone, Stop! ▪ Spotters will be used when backing up trucks and heavy equipment and when moving equipment. ▪ High visibility vests will be worn when workers are exposed to vehicular traffic at the site or on public roads.
	3R) Struck/cut by tools	3R) Struck/cut by tools ▪ Cut resistant work gloves will be worn when dealing with sharp objects. ▪ All hand and power tools will be maintained in safe condition. ▪ Do not drop or throw tools. Tools shall be placed on the ground or worksurface or handed to another employee in a safe manner. ▪ Guards will be kept in place while using hand and power tools.
	3S) Caught in/on/between	3S) Caught in/on/between ▪ Workers will not position themselves between equipment and a stationary object. ▪ Workers will not wear long hair down (place in pony-tail and tuck into shirt) or jewelry if working with tools/machinery.
	3T) Contact with Electricity/Lightning	3T) Contact with Electricity/Lighting ▪ All electrical tools and equipment will be equipped with GFCI. ▪ Electrical extension cords will be of the “Hard” or “Extra Hard” service type. ▪ All extension cords shall have a three-blade grounding plug. ▪ Personnel shall not use extension cords with damaged outer covers, exposed inner wires, or splices. ▪ Electrical cords shall not be laid across roads where vehicular traffic may damage the cord without appropriate guarding. ▪ All electrical work will be conducted by a licensed electrician. ▪ All equipment will be locked out and tagged out and rendered in a zero energy state prior to commencing any operation that may exposed workers to electrical, mechanical, hydraulic, etc. hazards. ▪ All utilities will be marked prior to excavation activities. ▪ All equipment will stay a minimum of 10 feet from overhead energized electrical lines (50 kV). This distance will increase by 4 inches for each 10 kV above 50 kV. Rule of Thumb: Stay 10 feet away from all overhead powerlines known to be 50 kV or less and 35 feet from all others.) ▪ The SHSO shall halt outdoor site operations whenever lightning is visible, outdoor work will not resume until 30 minutes after the last sighting of lightning.
	3U) Equipment failure	3U) Equipment failure ▪ All equipment will be inspected before use. If any safety problems are noted, the equipment should be tagged and removed from service until repaired or replaced.

MACTEC

Job Hazard Analysis – HASP Format

Job Title: Field Work - General **Date of Analysis:** 8/15/06

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3V) Hand & power tool usage.	3V) Hand & power tool usage ▪ Daily inspections will be performed. ▪ Ensure guards are in place and are in good condition. ▪ Remove broken or damaged tools from service. ▪ Use the tool for its intended purpose. ▪ Use in accordance with manufacturers instructions. ▪ No tampering with electrical equipment is allowed (e.g., splicing cords, cutting the grounding prong off plug, etc.) ▪ See JHA for Power Tool Use - Electrical and Power Tool Use - Gasoline
	3W) Fire Protection	3W) Fire Protection ▪ Ensure that adequate number and type of fire extinguishers are present at the site ▪ Inspect fire extinguishers on a monthly basis – document ▪ All employees who are expected to use fire exinguishers will have received training on an annual basis. ▪ Obey no-smoking policy ▪ Open fires are prohibited ▪ Maintain good housekeeping. Keep rubbish and combustibles to a minimum. ▪ Keep flammable liquids in small containers with lids closed or a safety can. ▪ When dispensing flammable liquids, do in well vented area and bond and ground containers.
	3X) Confined Space Entry	3X) Confined Space Entry ▪ See JHA for Confined Space Entry
4. Environmental health considerations	4A) Heat Stress	4A) Take precautions to prevent heat stress ▪ Remain constantly aware of the four basic factors that determine the degree of heat stress (air temperature, humidity, air movement, and heat radiation) relative to the surrounding work environmental heat load. ▪ Know the signs and symptoms of heat exhaustion, heat cramps, and heat stroke. Heat stroke is a true medical emergency requiring immediate emergency response action. NOTE: The severity of the effects of a given environmental heat stress is decreased by reducing the work load, increasing the frequency and/or duration of rest periods, and by introducing measures which will protect employees from hot environments. ▪ Maintain adequate water intake by drinking water periodically in small amounts throughout the day (flavoring water with citrus flavors or extracts enhances palatability). ▪ Allow approximately 2 weeks with progressive degrees of heat exposure and physical exertion for substantial acclimatization. ▪ Acclimatization is necessary regardless of an employee's physical condition (the better one's physical condition, the quicker the acclimatization). Tailor the work schedule to fit the climate, the physical condition of employees, and mission requirements. ▪ A reduction of work load markedly decreases total heat stress. ▪ Lessen work load and/or duration of physical exertion the first days of heat exposure to allow gradual acclimatization. ▪ Alternate work and rest periods. More severe conditions may require longer rest periods and electrolyte fluid replacement.

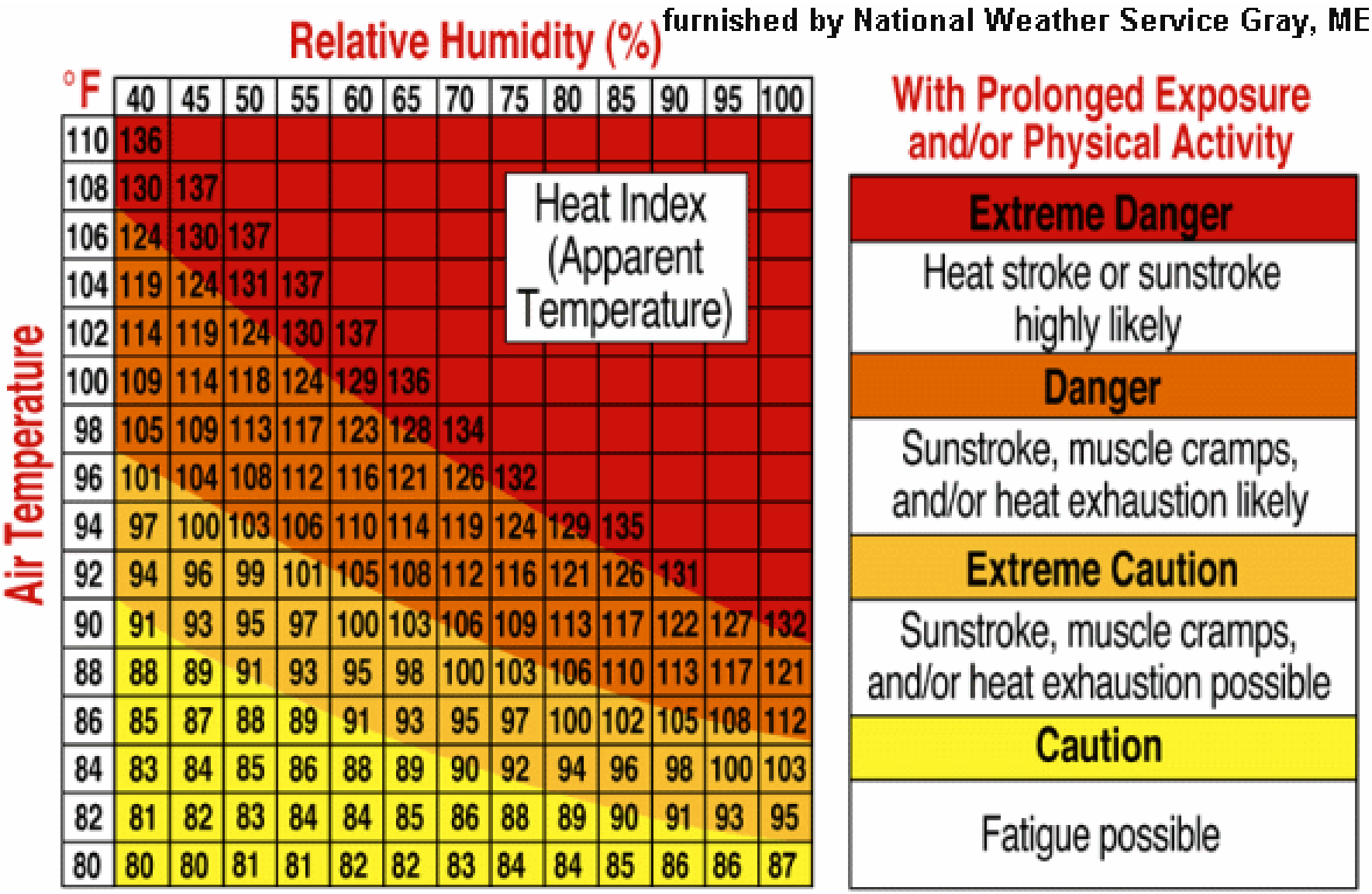
MACTEC

Job Hazard Analysis – HASP Format

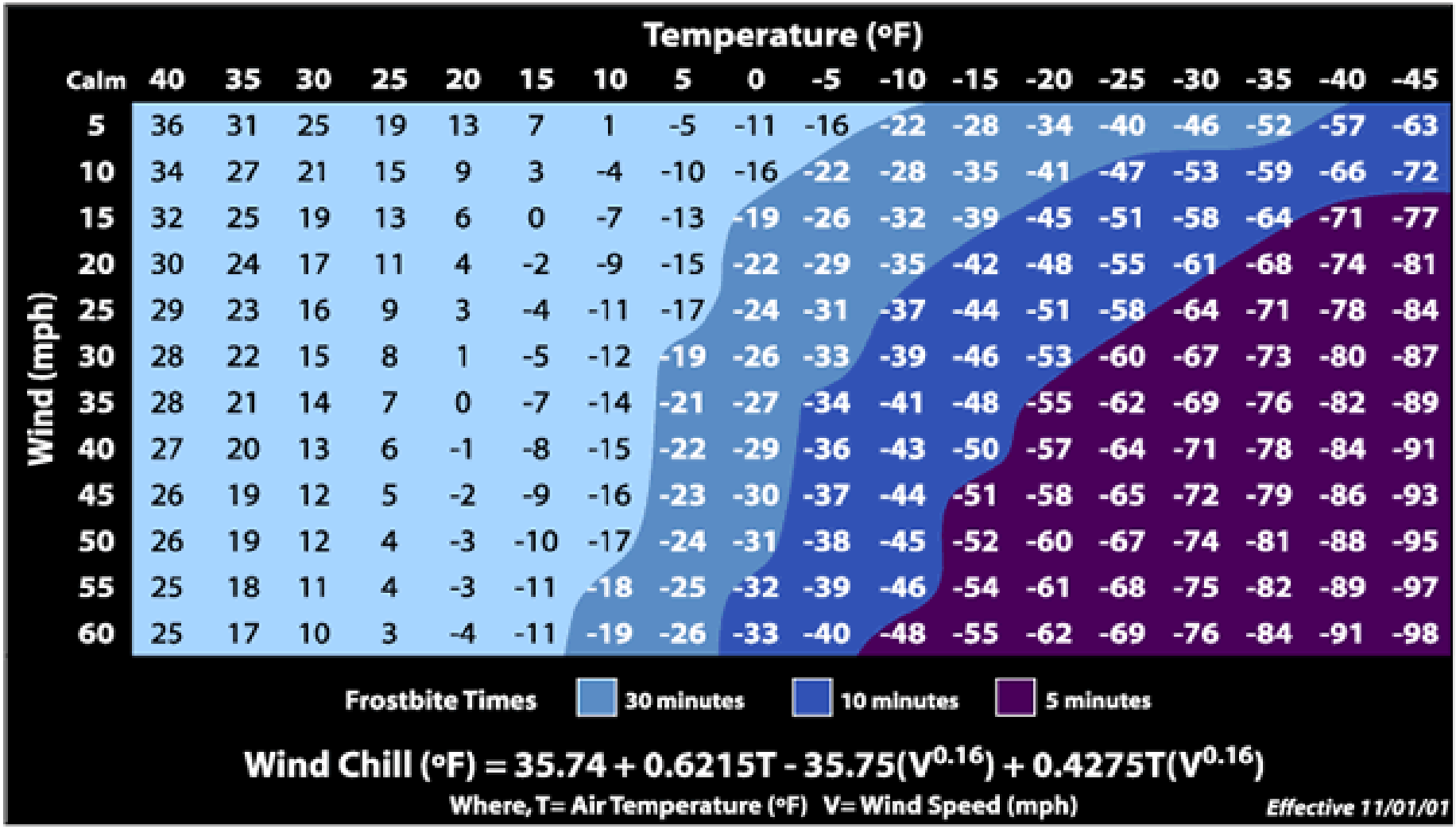
Job Title: Field Work - General **Date of Analysis:** 8/15/06

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	4B) Wet Bulb Globe Temperature (WBGT) Index	4B) WBGT ▪ Curtail or suspend physical work when conditions are extremely severe (see attached Heat Stress Index). ▪ Compute a Wet Bulb Globe Temperature Index to determine the level of physical activity (take WBGT index measurements in a location that is similar or closely approximates the environment to which employees will be exposed). WBGT THRESHOLD VALUES FOR INSTITUTING PREVENTIVE MEASURES 80-90 degrees F — Fatigue possible with prolonged exposure and physical activity. 90-105 degrees F — Heat exhaustion and heat stroke possible with prolonged exposure and physical activity. 105-130 degrees F — Heat exhaustion and heat stroke are likely with prolonged heat exposure and physical activity.
	4C) Cold Extremes	4C) Take precautions to prevent cold stress injuries ▪ Cover all exposed skin and be aware of frostbite. While cold air will not freeze the tissues of the lungs, slow down and use a mask or scarf to minimize the effect of cold air on air passages. ▪ Dress in layers with wicking garments (those that carry moisture away from the body – e.g., cotton) and a weatherproof slicker. A wool outer garment is recommended. ▪ Take layers off as you heat up; put them on as you cool down. ▪ Wear head protection that provides adequate insulation and protects the ears. ▪ Maintain your energy level. Avoid exhaustion and over-exertion which causes sweating, dampens clothing, and accelerates loss of body heat and increases the potential for hypothermia. ▪ Acclimate to the cold climate to minimize discomfort. ▪ Maintain adequate water/fluid intake to avoid dehydration.
	4D) Wind	4D) Effects of the wind ▪ Wind chill greatly affects heat loss (see attached Wind Chill Index). ▪ Avoid marking in old, defective timber, especially hardwoods, during periods of high winds due to snag hazards.
	4E) Thunderstorms	4E) Thunderstorms ▪ Monitor weather channels to determine if electrical storms are forcased. ▪ Plan ahead and identify safe locations to be in the event of a storm. (e.g., sturdy building, vehicle, etc.) ▪ Suspend all field work at the first sound of thurnder. You should be in a safe place when the time between the lightning and thunder is less than 30 seconds. ▪ Only return to work 30 minutes after the after the last strike or sound of thunder

furnished by National Weather Service Gray, ME



Wind Chill Chart



Wind (mph) \ Temperature (°F)	Calm	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
5		36	31	25	19	13	7	1	-5	-11	-16	-22	-28	-34	-40	-46	-52	-57	-63
10		34	27	21	15	9	3	-4	-10	-16	-22	-28	-35	-41	-47	-53	-59	-66	-72
15		32	25	19	13	6	0	-7	-13	-19	-26	-32	-39	-45	-51	-58	-64	-71	-77
20		30	24	17	11	4	-2	-9	-15	-22	-29	-35	-42	-48	-55	-61	-68	-74	-81
25		29	23	16	9	3	-4	-11	-17	-24	-31	-37	-44	-51	-58	-64	-71	-78	-84
30		28	22	15	8	1	-5	-12	-19	-26	-33	-39	-46	-53	-60	-67	-73	-80	-87
35		28	21	14	7	0	-7	-14	-21	-27	-34	-41	-48	-55	-62	-69	-76	-82	-89
40		27	20	13	6	-1	-8	-15	-22	-29	-36	-43	-50	-57	-64	-71	-78	-84	-91
45		26	19	12	5	-2	-9	-16	-23	-30	-37	-44	-51	-58	-65	-72	-79	-86	-93
50		26	19	12	4	-3	-10	-17	-24	-31	-38	-45	-52	-60	-67	-74	-81	-88	-95
55		25	18	11	4	-3	-11	-18	-25	-32	-39	-46	-54	-61	-68	-75	-82	-89	-97
60		25	17	10	3	-4	-11	-19	-26	-33	-40	-48	-55	-62	-69	-76	-84	-91	-98

Frostbite Times — 30 minutes — 10 minutes — 5 minutes

$$\text{Wind Chill (°F)} = 35.74 + 0.6215T - 35.75(V^{0.16}) + 0.4275T(V^{0.16})$$

Where, T= Air Temperature (°F) V= Wind Speed (mph)

Effective 11/01/01

Job Hazard Analysis Form

Job Title: Field Work - Oversight **Date of Analysis:** 4/13/10
Minimum Recommended PPE*: High visibility vest, hard hat, steel-toed boots, safety glasses, hearing protection
*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Prepare for site visit	1A) N/A	▪ Obtain and review HASP prior to site visit, if possible ▪ Determine PPE needs – bring required PPE to the site, if not otherwise being provided at the site (e.g., steel toed boots) ▪ Determine training and medical monitoring needs and ensure all required Health and Safety training and medical monitoring has been received and is current ▪ Complete site specific/ client required training ▪ Ensure all workers are fit for duty (alert, well rested, and mentally and physically fit to perform work assignment) ▪ First aid kits shall be available at the work site and on each transport vehicle. ▪ Familiarize yourself with route to the site ▪ Check weather forecast. Pack appropriate clothing and other items (e.g., sunscreen) for anticipated weather conditions ▪ Verify that subsurface utilities have been identified.
2. Traveling to the site by vehicle	2A) See JHA for Mobilization, Demobilization and Site Preparation	▪ See JHA for Mobilization, Demobilization and Site Preparation
3. Initial Arrival - Assess Site Conditions	3A) Communication with subcontractor and other site personnel	▪ Develop communication methods (agree on hand signals, warning alarms) ▪ Log all workers and visitor on and off the site. ▪ Let other crewmembers know when you see a hazard. ▪ Avoid working near known hazards. ▪ Always know the whereabouts of fellow crewmembers. ▪ Carry a radio and spare batteries or cell phone ▪ Hold and document Safety tailgate meetings ▪ Establish work zones, evacuation routes and rally locations.
	3B) Insect Bites and Stings	▪ Discuss the types of insects expected at the Site and be able to identify them. ▪ Look for signs of insects. ▪ Inform crew members if allergic to insects and what to do if you need assistance. ▪ Avoid wearing heavy fragrances. ▪ Carry first-aid and sting relief kits. ▪ Carry identification of known allergies and necessary emergency medication. ▪ Spray clothing with insect repellant as a barrier. ▪ Wear light colored clothing that fits tightly at the wrists, ankles, and waist. ▪ Cover trouser legs with high socks or boots. ▪ Tuck in shirt tails.

	3C) Poisonous plants	▪ Wear long sleeves, long pants and boots ▪ Ensure all field workers can identify the plants. Mark identified poisonous plants with high visibility spray paint if working at a fixed location. ▪ Look for signs of poisonous plants and demark area to aid in avoiding plant. ▪ Do not touch any plant part to any part of your body/clothing. ▪ Use commercially available products such as Ivy Block or Ivy Wash as appropriate.
	3D) Vermin, leaches, animal borne disease	▪ Survey the area for dens, nests, etc. ▪ Identify areas where biological hazards may be present. ▪ Wear long sleeve shirt and full length pants ▪ Be aware of your surroundings. ▪ Wear appropriate footwear (snake boots, etc.) ▪ Avoid high grass areas if possible ▪ Do not put hand/arm into/under an area that you cannot see into/under clearly ▪ Perform routine inspections for ticks, leaches, etc. of yourself and co-workers.
	3E) Chemical Hazards	▪ Wear chemical resistant PPE as identified in the HASP ▪ Use monitoring equipment, as outlined in HASP, to monitor breathing zone ▪ Read MSDSs for all chemicals brought to the site ▪ Be familiar with hazards associated with site contaminants. ▪ Ensure that all containers are properly labeled
	3F) Overhead Power Lines	▪ Identify the location of all overhead power lines at the site. ▪ Maintain clearances depending on voltage - All equipment will stay a minimum of 10 feet from overhead energized electrical lines (50 kV or less). This distance will increase by 4 inches for each 10 kV above 50 kV. Rule of Thumb: Stay 10 feet away from all overhead power lines known to be 50 kV or less and 35 feet from all others.) ▪ Re-locate work so it is not close to power lines ▪ Avoid storing materials under overhead power lines
	3G) Underground Utilities	▪ All utilities will be marked prior to excavation activities ▪ For areas where utility locations cannot be verified, workers must hand dig for the first 3 feet ▪ Use lineman's gloves when locating underground power lines ▪ Work at adequate offsets from utility locations ▪ Immediately cease work if unknown utility markings are discovered.

	3H) Cold Stress	▪ Dress in layers with wicking garments (those that carry moisture away from the body – e.g., cotton) and a weatherproof slicker. A wool outer garment is recommended. ▪ Take layers off as you heat up; put them on as you cool down. ▪ Wear head protection that provides adequate insulation and protects the ears. ▪ Maintain your energy level. Avoid exhaustion and over-exertion which causes sweating, dampens clothing, and accelerates loss of body heat and increases the potential for hypothermia. ▪ Acclimate to the cold climate to minimize discomfort. ▪ Maintain adequate water/fluid intake to avoid dehydration. ▪ Be aware of signs of hypothermia, its prevention, detection and treatment. ▪ Have extra protection available, in case of an emergency such as blankets and heating devices. ▪ Don't work under extremely adverse weather conditions ▪ Stay in tune to current weather and extended forecasts.
	3I) Heat Stress	▪ Remain constantly aware of the four basic factors that determine the degree of heat stress (air temperature, humidity, air movement, and heat radiation) relative to the surrounding work environmental heat load. ▪ Know the signs and symptoms of heat exhaustion, heat cramps, and heat stroke. Heat stroke is a true medical emergency requiring immediate emergency response action. ▪ Maintain adequate water intake by drinking water periodically in small amounts throughout the day (flavoring water with citrus flavors or extracts enhances palatability). ▪ Lessen work load and/or duration of physical exertion the first days of heat exposure to allow gradual acclimatization. ▪ Alternate work and rest periods. More severe conditions may require longer rest periods and electrolyte fluid replacement.
	3J) Lightning and Thunder	▪ Monitor weather channels to determine if electrical storms are forecasted. ▪ Plan ahead and identify safe locations to be in the event of a storm. (e.g., sturdy building, vehicle, etc.) ▪ Suspend all field work at the first sound of thunder. You should be in a safe place when the time between the lightning and thunder is less than 30 seconds.
	3K) Severe Weather	▪ Watch for clouds and incoming weather. ▪ Monitor weather forecasts. ▪ Train workers about weather and appropriate precautions. ▪ Identify a shelter and a safe place in event of tornado etc
	3L) Sun	▪ Keep body protected ▪ Wear sunscreen, wide brimmed hat or hardhat. ▪ Schedule work for cool part of day. ▪ Take breaks in the shade.
	3M) High Crime Areas	▪ Do not enter areas where threats are present. ▪ Contract security where applicable. Use the buddy system. ▪ Maintain contact with support such as radio or cell phone ▪ Do not work after dark.

	3N) Operations conducted at an active facility	▪ Stay well clear of operations being conducted at the facility ▪ Keep alert for moving materials, equipment or vehicles ▪ Determine client specific PPE needs prior to arriving at the site ▪ Determine client specific emergency response procedures and follow as appropriate ▪ Participate in client required safety training ▪ Get copies of Clients MSDSs for any client chemicals that workers may be exposed to. ▪ Provide MSDSs to client for all chemicals brought to the site.
	3O) Remote Locations	▪ Carry a two-way radio and know how to use it. ▪ Work in teams. Account for all at the end of the work day. ▪ Make sure someone on crew is certified in first aid. ▪ Carry a first aid kit.
	3P) Set up Decon Station	▪ Refer to MSDS for specific hazards associated with decon solutions ▪ Monitor breathing zone for decon solutions (e.g., methanol, hexane, etc.), if appropriate (see HASP) ▪ Removal of PPE will be performed by the following tasks in the listed order: o Gross boot wash and rinse and removal o Outer glove removal o Suit removal o Respirator removal (if worn). o Inner glove removal ▪ Contaminated PPE is to be placed in the appropriate, provided receptacles. ▪ Employees will wash hands, face, and any other exposed areas with soap and water. ▪ Portable eyewash stations and showers will be available should employees come into direct contact with contaminated materials. ▪ Decon solutions will be disposed of according to the work plan.
4. Walk around the Site	4A) Poisonous plants	▪ See section 3C above
	4B) Vermin, leaches, animal borne disease	▪ See Section 3 D above ▪
	4C) Chemical Hazards	▪ See Section 3 E above
	4D) Slips/Trips/Falls	▪ Wear slip resistant footwear preferably laced boots with a minimum 8" high upper and non-skid soles for ankle support and traction. ▪ Pay attention to where you place your feet ▪ Slow down and use extra caution around logs, rocks, and animal holes. ▪ Extremely steep slopes (>50%) can be hazardous under wet or dry conditions; consider an alternate route. ▪ Site SHSO will inspect the entire work area to identify and mark hazards. ▪ Clear area of trip hazards; mark or barricade those that cannot be moved; ▪ Use caution when walking around excavated areas ▪ Stay back at least 5 feet from excavated areas ▪ Use caution when walking on or around loose soil. ▪ Be aware of surroundings. Avoid muddy areas if possible.

5. Oversight during drilling, or construction operations	5A) Heavy Equipment/ Vehicles	▪ Spotters will be used when backing up trucks and heavy equipment and when moving equipment. ▪ Ground personnel in the vicinity of vehicles or heavy equipment operations will be within the view of the operator at all times. ▪ Ground personnel will be aware of the swing radius and maintain an adequate buffer zone. ▪ Ground personnel will not stand directly behind heavy equipment when it is in operation. ▪ Personnel are prohibited from riding on the buckets, or elsewhere on the equipment except for designated seats with proper seat belts or lifts specifically designed to carry workers. Ground personnel will stay clear of all suspended loads. ▪ Ground personnel will wear high visibility vests ▪ Eye contact with operators will be made before approaching equipment.
	5B) Eye Injury	▪ Wear appropriate safety glasses (tinted for sun). ▪ Watch where you walk, especially around trees and brush with protruding limbs.
	5C) Foot Injury	▪ Wear steel toed boots ▪ Wear insulated steel toed boots during winter ▪ Ensure shoes/boots have good traction ▪ Pay attention to where you place your feet, especially when walking on uneven terrain
	5D) Head Injury	▪ Wear hardhat ▪ Do not walk or work under scaffolding or other elevated work unless there are guardrails and toeboards in place ▪ Flag or mark protruding objects at head level
	5E) Chemical Hazards	▪ See Section 3E above ▪ Wash hands and face prior to consumption of food, beverage or tobacco.
	5F) Dust - particulates (respiratory)	▪ Use dust suppression methods ▪ Stand upwind of point of dust generation
	5G) Overhead Power Lines	▪ See Section 3F above.
	5H) Underground Utilities	▪ See Section 3G above
	5I) Standing/Static Posture	▪ Change posture on a frequent basis ▪ Stretch prior to any physical activity
	5J) Slips/`Trips/Falls	▪ See Section 4D above
	5K) Noise	▪ Hearing protection will be worn with a noise reduction rating capable of maintaining personal exposure below 85 dBA (ear muffs or plugs). ▪ All equipment will be equipped with manufacturer's required mufflers. ▪ Hearing protection shall be worn by all personnel working in or near heavy equipment. ▪ Hearing protection will be worn when workers need to shout when standing two feet away from each other. ▪ Segregate noisy equipment from the operators ▪ Use sound dampening around noisy equipment

	5L) Moving Equipment	▪ Clear area of obstructions and communicate with all workers involved that drilling is beginning ▪ Do not exceed manufacturer's recommended speed, force, torque, or other specifications. and penetrate the ground slowly with hands on the controls for at least the first foot of soil to minimize chance of auger kick-out ▪ Stay clear of rotating auger ▪ Use long-handled shovel to clear away cuttings when auger has stopped ▪ Do not wear loose clothing ▪ Wear appropriate PPE including leather gloves and steel-toed boots (See HASP)
6. Sampling Oversight	6A) Chemical Hazards	▪ See Section 3E above ▪ Wash hands and face prior to consumption of food, beverage or tobacco. ▪ Calibrate meters in a clean, well ventilated area ▪ Store calibration gases in well vented area. Ensure chemical labels and warnings are legible.
	6B) Personnel Decontamination	▪ Refer to MSDS for specific hazards associated with decon solutions ▪ Monitor breathing zone for decon solutions (e.g., methanol, hexane, etc.), if appropriate (see HASP) ▪ Removal of PPE will be performed by the following tasks in the listed order: o Gross boot wash and rinse and removal o Outer glove removal o Suit removal o Respirator removal (if worn). o Inner glove removal ▪ Contaminated PPE is to be placed in the appropriate, provided receptacles. ▪ Employees will wash hands, face, and any other exposed areas with soap and water. ▪ Portable eyewash stations and showers will be available should employees come into direct contact with contaminated materials. ▪ Decon solutions will be disposed of according to the work plan.
	6C) Lifting	▪ Good lifting techniques (lift with legs not back) ▪ Mechanical devices (e.g., hand truck, cart, forklift, etc.) should be used to reduce manual handling of materials and drums. ▪ Team lifting should be utilized if mechanical devices are not available. (mandatory for items over 50 lbs) ▪ Split heavy loads in to smaller loads ▪ Make sure that path is clear prior to lift. ▪ Redesign work area to avoid low lifts ▪ Stretch prior to lifting ▪ Maintain a healthy life style and level of physical fitness.
	6D) Hand Tools	▪ Cut resistant work gloves will be worn when dealing with sharp objects. ▪ All hand and power tools will be maintained in safe condition. ▪ Do not drop or throw tools. Tools shall be placed on the ground or work surface or handed to another employee in a safe manner. ▪ Guards will be kept in place while using hand and power tools. ▪ Daily inspections will be performed. ▪ Remove broken or damaged tools from service and tag out as defective ▪ No tampering with electrical equipment is allowed (e.g., splicing cords, cutting the grounding prong off plug, etc.) ▪ Do not use excessive force or impact ▪ Do not use tool improperly. Ensure all workers are trained

	6E) Slips/Trips/Falls	▪ See Section 4D above.
	6F) Struck by Vehicle	▪ Ground personnel in the vicinity of vehicles operations will be within the view of the operator at all times. ▪ Ground personnel will not stand directly behind vehicles when it is in operation ▪ Drivers will keep workers on foot in their vision at all times, if you lose sight of someone, Stop! ▪ High visibility vests will be worn when workers are exposed to vehicular traffic at the site or on public roads. ▪ Try to park so that you don't have to back up to leave. ▪ If backing in required, walk around vehicle to identify any hazards (especially low level hazards that may be difficult to see when in the vehicle) that might be present. Use a spotter if necessary ▪ Place cones in the font and rear of the vehicle ▪ Prior to driving off, walk around vehicle to collect cones and identify any hazards - especially low level hazards that may be difficult to see when in the vehicle. ▪ Set up "Workers in the Road" or similar warning signs and cones to alert traffic. ▪ Use emergency flashers and roof top flashing light (recommended) to alert oncoming vehicular traffic. ▪ Remain alert at all times as to the traffic outside the vehicle. Step to the side of the road when distracted by by-standers. Keep unofficial personnel out of the work area. ▪ Exit vehicle with caution. ▪ Wear High Visibility Vest when outside the vehicle. ▪ Utilize vehicle as a shield from oncoming traffic, as practical
7. IDW pickup oversight	7A) Foot Injury	▪ See Section 5C above.
	7B) Chemical Hazards	▪ See Section 3E above.
	7C) Lifting	▪ See Section 6C above.
	7D) Slips/Trips/Falls	▪ See Section 4D above
8. Return to office/home	8A) See Mobilization/ Demobilization and Site Preparation JHA	**See Mobilization/ Demobilization and Site Preparation JHA**

MACTEC

Job Hazard Analysis - HASP Format

Job Title: Decontamination **Date of Analysis:** 5/30/06

Minimum Recommended PPE*: High visibility vest, hard hat, steel-toed boots, safety glasses, hearing protection
*See HASP for all required PPE

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

MACTEC

Job Hazard Analysis - HASP Format

Job Title: Decontamination **Date of Analysis:** 5/30/06

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3C) Slips/Trips/Falls	3C) Slips/Trips/Falls ▪ Be cautious as ground/plastic can become slippery ▪ Use boots or boot covers with good traction
4. Equipment and Sample Decontamination	4A) Chemical exposure when handling contaminated sample jars and equipment	4A) Chemical exposure ▪ Wear PPE as outlined in the HASP. ▪ Refer to MSDS for specific hazards associated with decon solutions ▪ Monitor breathing zone for contaminants ▪ Monitor breathing zone for decon solutions (e.g., methanol, hexane, etc.) if appropriate (see HASP)
	4B) Materials Handling related injuries	4B) Materials Handling related injuries ▪ Use proper lifting techniques when lifting heavy equipment ▪ Use two person lift for heavy coolers
5. Personal Decontamination	5A) Exposure to contaminants	5A) Exposure to contaminants ▪ Avoid bringing contaminated materials via shoes and clothing into the CRZ by examining such prior to exiting the EZ. ▪ Removal of PPE will be performed by the following tasks in the listed order: ▪ Gross boot wash and rinse and removal ▪ Outer glove removal ▪ Suit removal ▪ Respirator removal (if worn). ▪ Inner glove removal ▪ Contaminated PPE is to be placed in the appropriate, provided receptacles. ▪ Respirators will be removed and decontaminated at a specified location within the CRZ by a designated technician, then placed in storage bag. ▪ Employees will wash hands, face, and any other exposed areas with soap and water. ▪ Portable eyewash stations and showers will be available should employees come into direct contact with contaminated materials. ▪ See MSDSs for hazards associated with the decontamination solutions used. ▪ Decon solutions will be disposed of according to the work plan.

MACTEC

Job Hazard Analysis - HASP Format

Job Title: Groundwater Sampling **Date of Analysis:** 9/21/06

Minimum Recommended PPE*: steel-toed boots, safety glasses, chemical resistant gloves
*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Mobilization	1A) See JHA Mobilization/Demobilization/Site Preparation	1A) See JHA Mobilization/Demobilization/Site Preparation
2. General Site Hazards	2A) See JHA Field Work - General	2A) See JHA Field Work - General
	2B) Chemical exposure	2B) Chemical Exposure ▪ Read HASP and determine air monitoring and PPE needs.
3. Calibrate monitoring equipment	3A) Exposure to calibration gases	3A) Exposure to calibration gases ▪ Review equipment manuals ▪ Calibrate in a clean, well ventilated area
4. Opening the well cap, taking water level readings	4A) Contact with poisonous plants or the oil from poisonous plants	4A) Contact with poisonous plants or the oil from those plants: ▪ Look for signs of poisonous plants and avoid. ▪ Ensure all field workers can identify the plants. Mark identified poisonous plants with spray paint if working at a fixed location. ▪ Wear PPE as described in the HASP. ▪ Do not touch any part of your body/clothing. ▪ Always wash gloves before removing them. ▪ Discard PPE in accordance with the HASP. ▪ Use commercially available products such as Ivy Block or Ivy Wash as appropriate.
	4B) Contact with biting insects (i.e., spiders, bees, etc.) which may have constructed a nest in the well cap/well.	4B) Contact with stinging/biting insects ▪ Discuss the types of insects expected at the Site and be able to identify them. ▪ Look for signs of insects in and around the well. ▪ Wear Level of PPE as described in the HASP. At a minimum, follow guidelines in the JHA "Insects Stings and Bites." ▪ If necessary, wear protective netting over your head/face. ▪ Avoid contact with the insects if possible. ▪ Inform your supervisor and the Site Health and Safety Supervisor if you have any allergies to insects and insect bites. Make sure you have identification of your allergies with you at all times and appropriate response kits if applicable. ▪ Get medical help immediately if you are bitten by a black widow or brown recluse, or if you have a severe reaction to any spider bite or bee sting.
	4C) Exposure to hazardous Inhalation and contact with hazardous substances (VOC contaminated groundwater/ soil); liquid splash; flammable atmospheres.	4C) Exposure to hazardous substances ▪ Wear PPE as identified in HASP. ▪ Review hazardous properties of site contaminants with workers before sampling operations begin ▪ Immediately monitor breathing zone after opening well to determine exposure and verify that level of PPE is adequate – see Action Levels in HASP ▪ Monitor headspace in well. After the initial headspace reading (if required by the Work Plan), allow the well to vent for several minutes before obtaining water level and before sampling. ▪ When decontaminating equipment wear additional eye/face protection over the safety glasses such as a face shield.
	4D) Back strain due to lifting bailers or pumps and from moving equipment to well locations	4D) Back strain ▪ Use mechanical aids when possible, if mechanical aids are not available, use two person lifts for heavy items. ▪ Use proper lifting techniques

MACTEC

Job Hazard Analysis - HASP Format

Job Title: Groundwater Sampling **Date of Analysis:** 9/21/06

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	4E) Foot injuries from dropped equipment	4E) Foot Injuries ▪ Be aware when moving objects, ensure you have a good grip when lifting and carrying objects. ▪ Do not carry more than you can handle safely ▪ Wear Steel toed boots
5. Collecting water samples	5A) Fire/Explosion/Contamination hazard from refueling generators	5A) Fire/Explosion/Contamination hazard from refueling generators ▪ Turn the generator off and let it cool down before refueling ▪ Segregate fuel and other hydrocarbons from samples to minimize contamination potential ▪ Transport fuels in approved safety containers. The use of containers other than those specifically designed to carry fuel is prohibited ▪ See JHA for Gasoline use
	5B) Electrocution	5B) Electrocution ▪ A ground fault circuit interrupter (GFCI) device must protect all AC electrical circuits. ▪ Use only correctly grounded equipment. Never use three-pronged cords which have had the third prong broken off. ▪ Make sure that the electrical cords from generators and power tools are not allowed to be in contact with water ▪ Do not stand in wet areas while operating power equipment ▪ Always make sure all electrically-powered sampling equipment is in good repair. Report any problems so the equipment can be repaired or replaced. ▪ When unplugging a cord, pull on the plug rather than the cord. ▪ Never do repairs on electrical equipment unless you are both authorized and qualified to do so.
	5C) Exposure to contaminants	5C) Exposure to Contaminants ▪ Stand up wind when sampling ▪ Monitor breathing zone with appropriate monitoring equipment (see HASP) ▪ Wear chemical resistant PPE as identified in HASP ▪ See section 4C) under Safe Practices above
	5D) Infectious water born diseases	5D) Infectious water born diseases ▪ Wear chemical resistant gloves and other PPE – as identified in HASP ▪ Prevent water from contacting skin ▪ Wash exposed skin with soap and water ASAP after sampling event ▪ Ensure that all equipment is adequately decontaminated using a 10% bleach solution
	5E) Exposure to water preservatives	5E) Exposure to water preservatives ▪ Work in a well ventilated area, upwind of samples ▪ Wear chemical resistant PPE as identified in HASP ▪ When preserving samples always add acid to water, avoid the opposite. ▪ See JHA Working with Preservatives
	5F) Slips/trips/falls	5F) Slips/trips/falls ▪ Ground can become wet/muddy, created by spilled water ▪ Place all purged water in drums for removal ▪ Wear good slip resistant footwear
	5G) Repetitive Motion and other Ergonomic Issues	5G) Ergonomic Issues ▪ Use mechanical means where possible to raise and lower equipment into well. ▪ Alternate raising and lowering equipment between field sampling team members, and alternate bailing the well. ▪ Use safe lifting techniques.

MACTEC

Job Hazard Analysis - HASP Format

Job Title: Groundwater Sampling **Date of Analysis:** 9/21/06

Key Work Steps	Hazards/Potential Hazards	Safe Practices
6. Sample Processing	6A) Contaminated water	6A) Contaminated water ▪ Wear appropriate PPE as identified in HASP ▪ Decontaminate outside of bottles ▪ Prevent water from contacting skin ▪ Work in well ventilated area – upwind of samples ▪ Waste will be returned to the operation office for storage and disposal
7. Shipping Samples	7A) Freeze burns, back strain, hazardous chemical exposure, sample leakage	7A) Freeze burns, back strain, hazardous chemical exposure, sample leakage ▪ Wear appropriate chemical resistant gloves as identified in HASP. ▪ Wear leather or insulated gloves when handling dry ice. ▪ Follow safe lifting techniques – get help lifting heavy coolers. ▪ Samples that contain hazardous materials under the DOT definition, must be packaged, manifested and shipped by personnel that have the appropriate DOT HAZMAT training.

MACTEC

Job Hazard Analysis - HASP Format

Job Title: Insect Stings and Bites **Date of Analysis:** 4/20/06

Minimum Recommended PPE*: Long sleeved shirt and pants, light colored clothing
*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Traveling/working in areas with potential Tick Bites –Example outdoor wooded areas or fields.	1. Lyme Disease, Rocky Mountain Spotted Fever, etc.	▪ Spray clothing with insect repellant as a barrier. ▪ Wear light colored clothing that fits tightly at the wrists, ankles, and waist. ▪ Each outer garment should overlap the one above it. ▪ Cover trouser legs with high socks or boots. ▪ Tuck in shirt tails. ▪ Search the body on a regular basis, especially hair and clothing; ticks generally do not attach for the first couple of hours. ▪ If a tick becomes attached, pull it by grasping it as close as possible to the point of attachment and pull straight out with gentle pressure. Wash skin with soap and water then cleanse with rubbing alcohol. Place the tick in an empty container for later identification, if the victim should have a reaction. Record dates of exposure and removal. ▪ Do not try to remove the tick by burning with a match or covering it with chemical agents. ▪ If you can not remove the tick, or the head detaches, seek propmt medical help. ▪ Watch for warning signs of illness: a large red spot on the bite area; fever, chills, headache, joint and muscle ache, significant fatigue, and facial paralysis are reactions that may appear within two weeks of the attack. Symptoms specific to Lyme disease include: confusion, short-term memory loss, and disorientation.
2. Working/traveling in areas with potential bee and wasp stings-Example wooded areas and fields	2. Allergic reactions, painful stings	▪ Be alert to hives in brush or in hollow logs. Watch for insects travelling in and out of one location. ▪ If you or anyone you are working with is known to have allergic reactions to bee stings, tell the rest of the crew and your supervisor. Make sure you carry emergency medication with you at all times. ▪ Wear long sleeve shirts and trousers; tuck in shirt.. Bright colors and metal objects may attract bees. ▪ If you are stung, cold compresses may bring relief. ▪ If a stinger is left behind, scrape it off the skin. Do not use a tweezers as this squeezes the venom sack, worsening the injury. ▪ If the victim develops hives, asthmatic breathing, tissue swelling, or a drop in blood pressure, seek medical help immediately. Give victim antihistime, (Benadryl, chlo-amine tabs).
3. Traveling/working in areas of potential Mosquito Bites-Example- Woods, fields, near bodies of water and etc.	3. Skin irritation, encephalitis	▪ Wear long sleeves and trousers. ▪ Avoid heavy scents. ▪ Use insect repellants. If using DEET, do not apply directly to skin, apply to clothing only. ▪ Carry after-bite medication to reduce skin irritation.

MACTEC

Job Hazard Analysis – HASP Format

Job Title: Gasoline **Date of Analysis:** 4/7/10

Minimum Recommended PPE*: High visibility vest, hard hat, steel-toed boots, safety glasses, hearing protection

*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Filling up gasoline containers	1A) Fire, Explosion	1A) Fire, Explosion ▪ Shut off the vehicles engine ▪ Do not smoke while filling container ▪ Touch the side of the vehicle to discharge any static build up on you prior to filling the containers. ▪ Only use approved containers with approved labels. ▪ Remove gasoline cans from field vehicle to fill. Place gasoline container on the ground to help dissipate electrical charges. Do not fill gasoline containers in pickup truck, especially those with plastic bed liners. Static electricity may cause fire or explosion. ▪ Manually control the nozzle valve throughout the filling process ▪ Fill container slowly – will decrease the chance of static ignition buildup and minimize incidents of spillage or splattering ▪ Keep nozzle in contact with gasoline container at all times to avoid static build-up ▪ Fill container no more than 95 percent full to allow for expansion ▪ Place cap tightly on the container after filling – do not use containers that do not seal properly ▪ Report spills to the attendant
	1B) Chemical Exposure	1B) Chemical Exposure ▪ Have gasoline MSDS on site. ▪ Keep face away from the nozzle or container opening ▪ Avoid prolonged breathing of gasoline vapors ▪ Never siphon gasoline by mouth ▪ If gasoline spills on the container, make sure that it has evaporated before placing container in your vehicle ▪ Place cap tightly on the container after filling – do not use containers that do not seal properly
2. Transporting gasoline	2A) Fire, Explosion	2A) Fire, Explosion ▪ Transport gasoline in an approved container with a flash arrestor vent and proper labeling ▪ Transport no more than 5 gallons. ▪ Make sure the container is secure from tipping and sliding ▪ Do not store gasoline overnight in field vehicles. ▪ Do not leave gasoline containers in the trunk of the vehicle or in direct sunlight.
	2B) Breathing gasoline vapors	2C) Breathing gasoline vapors ▪ Use only cans that are in good working order. ▪ Secure caps tightly to prevent vapors from entering the vehicle. ▪ Avoid transporting containers in the cab of the vehicle.

MACTEC

Job Hazard Analysis – HASP Format

Job Title: Gasoline **Date of Analysis:** 4/7/10

3. Storage	3A) Fire, Explosion	3A) Fire, Explosion ▪ Store gasoline in approved container. ▪ Store gasoline containers in a flammable liquid storage cabinet if available. ▪ Gasoline is a flammable liquid and should be stored at room temperature. ▪ Store away from potential heat sources such as the sun, hot water heater, space heater, furnace, generator, and other potential ignition sources ▪ Store in well ventilated area. ▪ Gasoline is heavier than air and can travel along the floor to ignition sources.
4. Refueling small gasoline engines	4A) Fire, Explosion	4A) Fire, Explosion ▪ Before using safety cans, open vent to release any built up pressure. ▪ Turn off engine and let engine cool down before refueling. ▪ Do not smoke while refueling equipment.

MACTEC

Job Hazard Analysis - HASP Format

Job Title: Working with Preservatives (Acids) **Date of Analysis:** 5/30/06

Minimum Recommended PPE*: Safety glasses/goggles, nitrile gloves,
*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Opening the box of ampoules	1A) Cuts or punctures with a knife	1A) Cuts or punctures with a knife ▪ Use appropriate techniques when handling a knife. Always cut away from you.
	1B) Broken ampoules in the box. Cuts from the broken glass.	1B) Broken ampoules in the box. Cuts from the broken glass. ▪ Wear safety goggles and protective gloves. ▪ Dispose of the preservative and broken glass by approved methods.
	1C) Broken ampoules in the box. Breathing fumes.	1C) Broken ampoules in the box. Breathing fumes. ▪ Wear safety goggles and protective gloves. ▪ Always work in a well-ventilated area.
2. Breaking top of glass ampoule	2A) Cuts from the broken glass.	2A) Cuts from the broken glass ▪ Wear safety goggles and protective gloves. ▪ Use a paper towel to wrap ampoule in to snap the top or use an ampoule breaker. ▪ Always point the ampoule away from you when you snap off the top.
	2B) Skin contact chemical burns.	2B) Skin contact chemical burns. ▪ Wear safety goggles and protective gloves. ▪ Fumes may come into contact with the perspiration on your skin and rehydrate to form an acid. ▪ If your skin itches, flush affected area for 15 minutes with water.
	2C) Eye contact	2C) Eye contact ▪ Wear safety goggles. ▪ If acid splashes in the eyes, flush eyes for 15 minutes with water. Seek medical advice.
	2D) Breathing fumes	2D) Breathing fumes ▪ HNO_3 and HCL have high vapor pressure. Always work in a well-ventilated area.
3. Adding acid to sample	3A) Chemical reaction	3A) Chemical reaction ▪ Wear safety goggles and protective gloves. Acid may react with high alkaline sample and fizz (releases CO_2).
	3B) Eye contact	3B) Eye contact ▪ Wear safety goggles. ▪ If acid splashes in the eyes, flush eyes for 15 minutes with water. Seek medical advice.
	3C) Skin contact chemical burns.	3C) Skin contact chemical burns. ▪ Wear safety goggles and protective gloves.
4. Ampoule disposal	4A) Cuts from the broken glass.	4A) Cuts from the broken glass. ▪ Wear safety goggles and protective gloves. ▪ Place used ampoules in an empty, non-reactive container in the field and bring it back to the office. Dispose of the preservative and broken glass by approved methods.

MACTEC

Job Hazard Analysis - HASP Format

Job Title: Static Water Level Readings **Date of Analysis:** 9/14/06

Minimum Recommended PPE*: Safety Glasses, High Visibility Vest, Steel Toed Boots

*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Work Preparation	1A) Chemical Exposures	1A) Chemical Exposures ▪ See HASP for PPE and air monitoring requirements ▪ Calibrate monitoring equipment ▪ Use monitoring equipment, as outlined in HASP, to monitor breathing zone ▪ Read MSDSs for all chemicals brought to the site ▪ Be familiar with hazards associated with site contaminants. ▪ Decon thoroughly prior to consumption of food, beverage or tobacco.
2. Open Well With Hand Tool And Remove Well Cap	2A) Knee Injury Due To Kneeling On Ground	2A) Knee Injury Due To Kneeling ▪ Check the area and remove any rocks or other sharp objects ▪ Kneel on some type of padding or leather glove ▪ Use chemical resistant material to kneel on if surface soil is contaminated.
	2B) Injury Due To Using Hand Tools	2B) Injury Due To Using Hand Tools ▪ Wear leather work gloves, when removing cover from well ▪ Be alert to hand position when using hand tools ▪ All hand tools will be maintained in safe condition. ▪ Do not drop or throw tools. Tools shall be placed on the ground or work surface or handed to another employee in a safe manner.
	2C) Slips/Trips/Falls	2C) Slips/Trips/Falls ▪ Maintain work areas safe and orderly; mark or repair possible tripping hazards. ▪ Always watch your footing. ▪ Horseplay is strictly prohibited ▪ Wear laced boots with a minimum 8" high upper and non-skid Vibram-type soles for ankle support and traction.
	2D) Materials Handling – Sprains/Strains	2D) Materials Handling – Sprains/Strains ▪ Clean out dirt and loosen cap with hammer if lid is difficult to open ▪ Use proper tools to open well cover and cap ▪ Use bucket to carry hand tools and equipment in.
	2E) Contact With Biting Insects (I.E., Spiders, Bees, Etc.) Which May Have Constructed A Nest In The Well Cap/Well.	2E) Contact With Stinging/Biting Insects ▪ Discuss the types of insects expected at the Site and be able to identify them. ▪ Look for signs of insects in and around the well. ▪ Wear Level of PPE as described in the HASP. At a minimum, follow guidelines in the JHA “Insects Stings and Bites.” ▪ Avoid contact with the insects if possible. ▪ Inform your supervisor and the Site Health and Safety Supervisor if you have any allergies to insects and insect bites. Make sure you have identification of your allergies with you at all times and appropriate response kits if applicable. ▪ Get medical help immediately if you are bitten by a black widow or brown recluse, or if you have a severe reaction to any spider bite or bee sting.

MACTEC

Job Hazard Analysis - HASP Format

Job Title: Static Water Level Readings **Date of Analysis:** 9/14/06

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	2F) Struck By Vehicle/Equipment	2F) Struck By Vehicle/Equipment ▪ Be aware of heavy equipment operations that may be working nearby. ▪ Keep out of the swing radius of heavy equipment. ▪ Ground personnel in the vicinity of vehicles or heavy equipment operations will be within the view of the operator at all times. ▪ Ground personnel will be aware of the counterweight swing and maintain an adequate buffer zone. ▪ Ground personnel will not stand directly behind heavy equipment when it is in operation. ▪ High visibility vests will be worn when workers are exposed to equipment or vehicular traffic.
3. Insert Probe Into Well and Take Reading	3A) Awkward Postures	3A) Awkward Postures ▪ Use small stool to sit on when sampling if warranted by sampling duration.
	3B) Chemical Exposures	3B) Chemical Exposures ▪ Wear PPE as identified in HASP ▪ Use monitoring equipment, as outlined in HASP, to monitor breathing zone ▪ Calibrate monitoring equipment ▪ Be familiar with hazards associated with site contaminants. ▪ Decon thoroughly prior to consumption of food, beverage or tobacco.
4. Replace Well Cap and Cover.	4A) Slips, Trips, Falls	4A) Slips, Trips, Falls ▪ See Section 2C above
	4B) Injury Due To Using Hand Tools	4B) Injury Due To Using Hand Tools ▪ See Section 2B above

MACTEC

Job Hazard Analysis - HASP Format

Job Title: Static Water Level Readings **Date of Analysis:** 9/14/06

MACTEC

Job Hazard Analysis - HASP Format

Job Title: Sub-Slab-Indoor Air Sampling **Date of Analysis:** 11/1/2007

Minimum Recommended PPE*: steel-toed boots, safety glasses, chemical resistant gloves-nitrile, flashlight/lamp
*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Mobilization	1A) See JHA Mobilization/Demobilization/Site Preparation	1A) See JHA Mobilization/Demobilization/Site Preparation
2. General Site Hazards	2A) See JHA Field Work - General	2A) See JHA Field Work - General
	2B) Chemical exposure	2B) Chemical Exposure ▪ Read HASP and determine air monitoring and PPE needs.
3. Calibrate monitoring equipment	3A) Exposure to calibration gases	3A) Exposure to calibration gases ▪ Review equipment manuals ▪ Calibrate in a clean, well ventilated area
4. Access Residence	4A) Tripping hazards	4A) Observe floors/stairs for potential tripping hazards
	4B) Back strain	4B) Watch back when carrying equipment into residence
	4C) Chemical Hazard	4C) Be careful when identifying residential chemicals ▪ Wear PPE as described in the HASP.
5. Drill Hole in basement floor	5A) Electrocution	5A) Electrocution ▪ A ground fault circuit interrupter (GFCI) device must protect all AC electrical circuits. ▪ Use only correctly grounded equipment. Never use three-pronged cords which have had the third prong broken off. ▪ Make sure that the electrical cords from generators and power tools are not allowed to be in contact with water ▪ Do not stand in wet areas while operating power equipment ▪ Always make sure all electrically-powered sampling equipment is in good repair. Report any problems so the equipment can be repaired or replaced. ▪ When unplugging a cord, pull on the plug rather than the cord. ▪ Never do repairs on electrical equipment unless you are both authorized and qualified to do so.
	5B) Exposure to hazardous Inhalation and contact with hazardous substances (VOC contaminated Soil Vapor).	5B) Exposure to hazardous substances ▪ Wear PPE as identified in HASP (steel-toed boots, safety glasses, nitrile gloves and a flashlight or lamp). ▪ Review hazardous properties of site contaminants with workers before sampling operations begin ▪ Immediately monitor breathing zone using a PID after drilling hole to determine exposure and verify that level of PPE is adequate – see Action Levels in HASP
	5C) Back strain due to lifting and from moving equipment	5C) Back strain ▪ Use mechanical aids when possible, if mechanical aids are not available, use two person lifts for heavy items. ▪ Use proper lifting techniques
	5D) Foot injuries from dropped equipment/drill bit	5D) Foot Injuries ▪ Be aware when moving objects, ensure you have a good grip when lifting and carrying objects. ▪ Do not carry more than you can handle safely ▪ Watch feet when drilling and hold drill firmly ▪ Wear Steel toed boots

MACTEC

Job Hazard Analysis - HASP Format

Job Title: Sub-Slab-Indoor Air Sampling **Date of Analysis:** 11/1/2007

Key Work Steps	Hazards/Potential Hazards	Safe Practices
6. Collecting Sub-Slab sample	6A) Burn Hazard/fire Hazard	6A) Burn Hazard/ Fire Hazard from Melting Wax ▪ Place hot plate in safe location away from flammable material ▪ Be careful with exposed skin when working around hot plate and hot wax. ▪ Poor wax with spoon and avoid splatter.
	6B) Cutting Hazard	6B) Be careful with sharp knives when cutting tubing
	6C) Exposure to contaminants	6C) Exposure to Contaminants ▪ Monitor breathing zone with appropriate monitoring equipment (see HASP) ▪ Wear chemical resistant PPE as identified in HASP ▪ See section 5B) under Safe Practices above
7. Collecting Indoor Air sample	7A) Pinching Hazard	7A) Pinching Hazard from attaching regulators/tubing ▪ Be careful when using wrenches to attach regulator and or tubing to cans to not pinch fingers

ALCONOX MSDS

Section 1 : MANUFACTURER INFORMATION

Product name: Alconox

Supplier: Same as manufacturer.

Manufacturer: Alconox, Inc.
30 Glenn St.
Suite 309
White Plains, NY 10603.

Manufacturer emergency phone number: 800-255-3924.
813-248-0585 (outside of the United States).

Manufacturer: Alconox, Inc.
30 Glenn St.
Suite 309
White Plains, NY 10603.

Supplier MSDS date: 2005/03/09

D.O.T. Classification: Not regulated.

Section 2 : HAZARDOUS INGREDIENTS

C.A.S.	CONCENTRATION %	Ingredient Name	T.L.V.	LD/50	LC/50
25155-30-0	10-30	SODIUM DODECYLBENZENESULFONATE	NOT AVAILABLE	438 MG/KG RAT ORAL 1330 MG/KG MOUSE ORAL	NOT AVAILABLE
497-19-8	7-13	SODIUM CARBONATE	NOT AVAILABLE	4090 MG/KG RAT ORAL 6600 MG/KG MOUSE ORAL	2300 MG/M3/2H RAT INHALATION 1200 MG/M3/2H MOUSE INHALATION
7722-88-5	10-30	TETRASODIUM PYROPHOSPHATE	5 MG/M3	4000 MG/KG RAT ORAL 2980 MG/KG MOUSE ORAL	NOT AVAILABLE
7758-29-4	10-30	SODIUM PHOSPHATE	NOT AVAILABLE	3120 MG/KG RAT ORAL 3100 MG/KG MOUSE ORAL >4640 MG/KG RABBIT DERMAL	NOT AVAILABLE

Section 2A : ADDITIONAL INGREDIENT INFORMATION

Note: (supplier).
CAS# 497-19-8: LD50 4020 mg/kg - rat oral.
CAS# 7758-29-4: LD50 3100 mg/kg - rat oral.

Section 3 : PHYSICAL / CHEMICAL CHARACTERISTICS

Physical state: Solid

Appearance & odor: Almost odourless.
White granular powder.

Odor threshold (ppm): Not available.

Vapour pressure (mmHg): Not applicable.

Vapour density (air=1): Not applicable.

By weight: Not available.

Evaporation rate (butyl acetate = 1): Not applicable.

Boiling point (°C): Not applicable.

Freezing point (°C): Not applicable.

pH: (1% aqueous solution).
9.5

Specific gravity @ 20 °C: (water = 1).
0.85 - 1.10

Solubility in water (%): 100 - > 10% w/w

Coefficient of water\oil dist.: Not available.

VOC: None

Section 4 : FIRE AND EXPLOSION HAZARD DATA

Flammability: Not flammable.

Conditions of flammability: Surrounding fire.

Extinguishing media: Carbon dioxide, dry chemical, foam.
Water
Water fog.

Special procedures: Self-contained breathing apparatus required.
Firefighters should wear the usual protective gear.

Auto-ignition temperature: Not available.

Flash point (°C), method: None

Lower flammability limit (% vol): Not applicable.

Upper flammability limit (% vol): Not applicable.

Not available.

Sensitivity to mechanical impact: Not applicable.

Hazardous combustion products: Oxides of carbon (COx).
Hydrocarbons.

Rate of burning: Not available.

Explosive power: None

Section 5 : REACTIVITY DATA

Chemical stability: Stable under normal conditions.

Conditions of instability: None known.

Hazardous polymerization: Will not occur.

Incompatible substances: Strong acids.
Strong oxidizers.

Hazardous decomposition products: See hazardous combustion products.

Section 6 : HEALTH HAZARD DATA

Route of entry: Skin contact, eye contact, inhalation and ingestion.

Effects of Acute Exposure

Eye contact: May cause irritation.

Skin contact: Prolonged contact may cause irritation.

Inhalation: Airborne particles may cause irritation.

Ingestion: May cause vomiting and diarrhea.
May cause abdominal pain.
May cause gastric distress.

Effects of chronic exposure: Contains an ingredient which may be corrosive.

LD50 of product, species & route: > 5000 mg/kg rat oral.

LC50 of product, species & route: Not available for mixture, see the ingredients section.

Exposure limit of material: Not available for mixture, see the ingredients section.

Sensitization to product: Not available.

Carcinogenic effects: Not listed as a carcinogen.

Reproductive effects: Not available.

Teratogenicity: Not available.

Mutagenicity: Not available.

Synergistic materials: Not available.

Medical conditions aggravated by exposure: Not available.

First Aid

Skin contact: Remove contaminated clothing.
Wash thoroughly with soap and water.
Seek medical attention if irritation persists.

Eye contact: Check for and remove contact lenses.
Flush eyes with clear, running water for 15 minutes while holding eyelids open: if irritation persists, consult a physician.

Inhalation: Remove victim to fresh air.
Seek medical attention if symptoms persist.

Ingestion: Dilute with two glasses of water.
Never give anything by mouth to an unconscious person.
Do not induce vomiting, seek immediate medical attention.

Section 7 : PRECAUTIONS FOR SAFE HANDLING AND USE

Leak / Spill: Contain the spill.
Recover uncontaminated material for re-use.
Wear appropriate protective equipment.
Contaminated material should be swept or shoveled into appropriate waste container for disposal.

Waste disposal: In accordance with municipal, provincial and federal regulations.

Handling procedures and equipment: Protect against physical damage.
Avoid breathing dust.
Wash thoroughly after handling.
Keep out of reach of children.
Avoid contact with skin, eyes and clothing.
Launder contaminated clothing prior to reuse.

Storage requirements: Keep containers closed when not in use.
Store away from strong acids or oxidizers.
Store in a cool, dry and well ventilated area.

Section 8 : CONTROL MEASURES

Precautionary Measures

Gloves / Type:

Neoprene or rubber gloves.

Respiratory / Type:

If exposure limit is exceeded, wear a NIOSH approved respirator.

Eye / Type:

Safety glasses with side-shields.

Footwear / Type: Safety shoes per local regulations.

Clothing / Type: As required to prevent skin contact.

Other / Type: Eye wash facility should be in close proximity.
Emergency shower should be in close proximity.

Ventilation requirements: Local exhaust at points of emission.

Health & Safety data sheet
According to EC Directive 91/155/EC and following amendments

Date of issue: 08 July 2004.

SECTION 1 - IDENTIFICATION OF THE PRODUCT AND OF THE COMPANY

Product name:
- HI 7022 ORP Solution for Platinum and Gold electrodes, 470 mV @ 25°C/77°F.

Application:
- ORP Solution for platinum and gold electrodes

Manufacturer identification: Hanna Instruments Italia s.r.l.
Viale delle Industrie, 12/A
35010 Villafranca Padovana, Italy
tel.: +39-049-9070211

Emergency Telephone n. °: +39-02-66101029
CENTRO ANTIVELENI
OSPEDALE NIGUARDA (MI) - ITALY

SECTION 2 - COMPOSITION/INFORMATION ON INGREDIENTS

Hazardous Ingredients:

NAME (EC directives)	***EC-Index-No.***	***CAS No.***	***LABELLING (EC directives)***	***CONTENT***
Sulfuric acid	016-020-00-8	7664-93-9	C R 35	≥ 5% - < 15%

(full text of R-phrases in section 16)

SECTION 3 - HAZARD IDENTIFICATION

Irritating to eyes and skin.

SECTION 4 - FIRST AID MEASURES

Remove contaminated, soaked clothing immediately and dispose of safely.
- **After inhalation** : if inhaled remove to fresh air. If breathing becomes difficult, call a physician.
- **After skin contact** : wash off with water and soap.
- **After eye contact** : rinse out with plenty of water for at least 15 minutes. If pain persists, summon medical advice.
- **After swallowing** : wash out mouth with plenty of water, provided person is conscious. Obtain medical attention if feeling unwell.

SECTION 5 – FIRE-FIGHTING MEASURES

- **Suitable extinguishing media:**
  - In adaptation to materials stored in the immediate neighborhood.
- **Special risks:**
  - Development of hazardous combustion gases or vapors possible in the event of fire.
  - Hydrogen may form upon contact with metals (danger of explosion!).
  - The following may develop in event of fire: sulfur oxides.
- **Special protective equipment for fire fighting:**
  - Do not stay in dangerous zone without suitable chemical protection clothing and self-contained breathing apparatus.
- **Additional information:**
  - Product itself is non-combustible. Cool container with spray water from a safe distance. Contain escaping vapors with water.
  - Fire residues and contaminated firefighting water must be disposed of in accordance with the local regulations.

SECTION 6 - ACCIDENTAL RELEASE MEASURES

- **Personal precautions:**
  - Take up with liquid-absorbent material. Clean up affected area and dispose according to local regulation**.**
- **Environmental precautions:**
  - Do not discharge into the drains/surface waters/groundwaters.
- **Additional notes:**
  - Render harmless: neutralize with diluted sodium hydroxide solution or by throwing on lime, lime sand, or sodium carbonate.

SECTION 7 - HANDLING AND STORAGE

- **Handling:**
  - Avoid generation of vapors/aerosols.
  - Do not inhale substance.
- **Storage:**
  - Tightly closed. In a well-ventilated place at +15 to +25 °C, protected from light.
  - Accessible only for authorized persons.

SECTION 8 - EXPOSURE CONTROL/PERSONAL PROTECTION

- **Engineering controls**
  - Safety shower and eye bath.
- **Ingredients with occupational exposure limits to be monitored:**
  - SULPHURIC ACID

EXPOSURE LIMITS - GERMANY

Source	Type	Value
TRGS 900	OEL	1 mg/m^3

Remarks: =1=

EXPOSURE LIMITS - DENMARK

Source	Type	Value
OEL	TWA	1 mg/m^3

- **Personal protective equipment**:
  - Protective clothing should be selected specifically for the working place, depending on concentration and quantity of the hazardous substances handled.
- **Respiratory protection:**
  - Required when vapors/aerosols are generated.
- **Protective gloves:**
  - Rubber or plastic
- **Eye protection:**
  - Goggles or face mask

SECTION 9 - PHYSICAL/CHEMICAL PROPERTIES

- **Appearance and odor** : light yellow liquid, odorless
- **Solubility in water** : Soluble
- **Melting point** : ND
- **Boiling point** : ND
- **pH value at 20ºC** : ≈ 1
- **Density at 20ºC** : ≈ 1 g/cm^3
- **Ignition temperature** : NA
- **Flash point** : NA
- **Thermal decomposition** : ND

SECTION 10 - STABILITY AND REACTIVITY

- **Conditions to be avoided:**
  - Strong heating.
- **Hazardous decomposition products:**
  - In the event of fire: see section 5.
- **Hazardous Polymerization:**
  - Will not occur.
- **Substances to be avoided:**
  - Alkali metals, alkali compounds, ammonia, alkaline earth compounds, alkalis, acids, alkaline earth metals, metals, metal alloys, permanganates, combustible substances, organic solvents, halogenates.

SECTION 11 - TOXICOLOGICAL INFORMATION

Quantitative data on the toxicity of this product are not available.

APPLICABLE TO MAIN COMPONENT(S):
The following applies to Sulfuric acid, as the pure substance:
Acute toxicity
LD50 (oral, rat): 2140 mg/kg (Using 25 % solution).
LC50 (inhalation, rat): 0.51 mg/l /2 h (calculated on the pure substance).
Specific symptoms in animal studies:
Skin irritation test (rabbit): burns.
Eye irritation test (rabbit): burns.
Toxicologic values are not available due to other dangerous properties of the substance.

Subacute to chronic toxicity
No appreciable contribution to the cancer risk in humans is to be expected where the limit value for occupational safety is observed.
An embryotoxic effect need not be feared when the threshold limit value is observed.
No teratogenic effect in animal experiments.
Bacterial mutagenicity: Ames-Test: negative.

Property of this product must be anticipated on the basis from the components of the preparation:

- **In case of inhalation of vapors/aerosols** : irritative symptoms in the respiratory tract.
- **In case of skin contact** : irritations.
- **In case of eye contact** : possibility of corneal lesions.
- **In case of ingestion** : damage to the affected mucous membranes possible.
- **Further data** : further hazardous properties cannot be excluded. The product should be handled with the care usual when dealing with chemicals.

SECTION 12 - ECOLOGICAL INFORMATION

Quantitative data on the toxicity of this product are not available.

APPLICABLE TO MAIN COMPONENT(S):
- The following applies to Sulphuric acid, as the pure substance:
  Biologic degradation:
  Methods for the determination of biodegradability are not applicable to inorganic substances.
  Behavior in environmental compartments:
  Concentration in organisms is not to be expected.
  Ecotoxic effects:
  Quantitative data on the ecological effect of this product are not available.
  Further ecologic data:
  Harmful effect on aquatic organisms. Harmful effect due to pH shift. Toxic effect on fish and algae. Caustic even in diluted form. Does not cause biological oxygen deficit. Endangers drinking water supplies if allowed to enter soil and/or waters in large quantities. Neutralization possible in waste water treatment plants.
  Daphnia toxicity: Daphnia magna EC 50 : 29 mg/l/24 h (calculated on the pure substance).

DO NOT ALLOW TO ENTER WATERS, WASTE WATERS, OR SOIL!

SECTION 13 - DISPOSAL CONSIDERATIONS

- **Waste disposal:**
  - Chemical residues are generally classified as special waste and thus covered by local regulations. Contact local authorities or disposal companies for advice.
  - Handle contaminated packaging in the same way as the substance itself.

SECTION 14 - TRANSPORT INFORMATION

Not subject to transport regulations.

SECTION 15 - REGULATORY INFORMATION

Labeling according to EC Directives:

Symbol:	**Xi**	Irritant.
R-phrases:	36/38	Irritating to eyes and skin.
S-phrases:	26	In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
Contains:	-	

SECTION 16 - OTHER INFORMATION

- **Text of any R phrases referred to under heading 2:**
  35 : Causes severe burns.
- **Supersedes edition of** : June 2002.
- **Reason for revision** : General update.
- **Legend** : NA Not applicable
  ND Not determined

THE INFORMATION CONTAINED HEREIN IS BASED ON THE PRESENT STATE OF OUR KNOWLEDGE. IT CHARACTERIZES THE PRODUCT WITH REGARD TO THE APPROPRIATE SAFETY PRECAUTIONS. IT DOES NOT REPRESENT A GUARANTEE OF THE PROPERTIES OF THE PRODUCT.

Material Safety Data Sheet

NCL of Wisconsin, Inc.
PO Box 8
Birnamwood, WI 54414
Emergency Telephone No: 800-424-9300 (Chemtrec)

Date of this revision: 11-02-2004

Product Identification

Product Name: YSI 3821 Buffer Solution, PH = 4.0
Synonyms: None. Molecular Weight: NA
Chemical Name: NA Chemical Family: NA
Product CAS#: NA Formula: NA

Ingredients

1. Potassium Acid Phthalate CAS# 877-24-7
   Percent: <2 SARA: Not Listed.
   TLV: Not established. PEL: Not Established
   Hazard: May cause eye and respiratory tract irritation.

2. Red Food Coloring CAS# Not listed.
   Percent: <0.02 SARA: Not listed
   TLV: Not established. PEL: Not established
   Hazard: None known.

3. Deionized Water CAS# 7732-18-5
   Percent: >98 SARA: Not listed.
   TLV: Not applicable PEL: Not applicable
   Hazard: None.

Precautionary Measures

Avoid contact with eyes, skin, and clothing. Wash thoroughly after handling. Minimal contact, as with all chemicals, is a good policy to follow.

Emergency/First Aid

In case of contact, immediately flush skin or eyes with plenty of water for at least 15 minutes. If swallowed, give two glasses of water or milk to dilute. Call a physician.

DOT Hazard Class: Not Regulated

Physical Data Section One

Appearance: Clear Pink solution
Odor: Odorless
Solubility: Infinitely soluble in water.
Boiling Point: 100° C (212° F)
Melting Point: 0° C (32° F)
Specific Gravity: 1.0
Vapor Density (Air=1): Essentially the same as water.
Vapor Pressure (mm Hg): Essentially the same as water.
Evaporation Rate: Essentially the same as water.

Fire and Explosion Information — Section Two

Fire: Not considered to be a fire hazard.
Explosion: Not considered to be and explosion hazard
Fire Extinguishing Media: Use any suitable means for extinguishing surrounding fire.

Reactivity Data — Section Three

Stability: Stable under ordinary conditions of use and storage
Hazardous Decomposition Products: May emit toxic fumes of carbon monoxide, carbon dioxide, and potassium oxide if involved in a fire.
Hazardous Polymerization: This substance does not polymerize.
Incompatibilities: Strong solutions of nitric acid.

Leak/Spill/Disposal Information — Section Four

Flush to sewer with large amounts of water.
Ensure compliance with Federal, State, and local regulations
Reportable Quantity: 5000 lbs.

Health Hazard Information — Section Five

A. Exposure/Health Effects

Inhalation: May cause irritation to mucous membranes due to slight acidity.
Ingestion: Large doses may cause nausea, vomiting and abnormal sensations in hands and feet. Because of slight acidity, may cause irritation to mucous membranes.
Skin Contact: May cause irritation, redness, and pain.
Eye Contact: May cause irritation and damage.
Chronic Exposure: No information found.
Cancer information: No information found for any ingredient
Aggravation of Pre-existing Conditions: No information found

B. First Aid

Inhalation: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion: If swallowed, give two glasses of water to dilute. Give medical attention immediately.
Skin Exposure: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing. Get medical attention if irritation develops or persists.
Eye Exposure: Wash eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attentions immediately.

Occupational Control Measures — Section Six

Ventilation System: In general, dilution ventilation is a satisfactory health hazard control for this material. However, if conditions of use create discomfort to a worker, a local exhaust should be considered.

Personal Respirators (NIOSH Approved): For conditions of use where exposure to mist exists, a dust/mist respirator may be worn. For emergencies, a self-contained breathing apparatus may be necessary.

Skin Protection: Rubber gloves and lab coat, apron or overalls.

Eye Protection: Use chemical safety goggles and/or a full face shield where splashing is possible. Contact lenses should not be worn when working with this material.

Maintain eye-wash fountain and quick-drench facilities in work areas.

Storage and Special Information — Section Seven

Keep in a tightly closed container. Protect container from physical damage.

END OF MATERIAL SAFETY DATA SHEET

MSDS

Material Safety Data Sheet

From: Vinquiry, Inc.
7795 Bell Road
Windsor, CA 95492

VINQUIRY

24 hour Emergency Telephone:
Chemtrec: 1-800-424-9300

Outside U.S. and Canada Chemtrec: 202-483-7616

NOTE: CHEMTREC and National Response Center emergency numbers to be used only in the event of chemical emergencies involving a spill, leak, fire, exposure or accident involving chemicals.

All Non-emergency questions should be directed to Customer Service (1-707-838-6312) for assistance.

Buffer pH 7, Yellow

Buffer Solution (Phosphate), pH 7 (Color Coded Yellow)

MSDS Number: BS031 --- *Effective Date: 12/1/04*

1. Product Identification

Synonyms: None.
CAS No.: Not applicable to mixtures.
Molecular Weight: Not applicable to mixtures.
Chemical Formula: Not applicable to mixtures.
Product Codes: 10-031-0000, 10-031-0237, 10-031-0473, 10-031-0946

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Potassium Phosphate Monobasic	7778-77-0	< 1%	No
Sodium Phosphate, Dibasic	7558-79-4	< 1%	No
Propylene Glycol	57-55-6	< 1%	No
FD & C Yellow No. 5	1934-21-0	< 1%	No
Water	7732-18-5	> 98%	No

3. Hazards Identification

Emergency Overview

As part of good industrial and personal hygiene and safety procedure, avoid all unnecessary exposure to the chemical substance and ensure prompt removal from skin, eyes and clothing.

Vinquiry Inc Saftey Ratings (Provided here for your convenience)

Health Rating: 0 - None
Flammability Rating: 0 - None
Reactivity Rating: 0 - None
Contact Rating: 1 - Slight
Lab Protective Equip: GOGGLES; LAB COAT
Storage Color Code: Orange (General Storage)

Potential Health Effects

Inhalation:
No adverse health effects via inhalation.
Ingestion:
Not expected to be a health hazard via ingestion. Large oral doses may cause irritation to the gastrointestinal tract.
Skin Contact:
Not expected to be a health hazard from skin exposure. May cause mild irritation and redness.
Eye Contact:
No adverse effects expected. May cause mild irritation, possible reddening.
Chronic Exposure:
No information found.
Aggravation of Pre-existing Conditions:
No information found.

4. First Aid Measures

Inhalation:
Not expected to require first aid measures. Remove to fresh air. Get medical attention for any breathing

difficulty.

Ingestion:

Not expected to require first aid measures. If large amounts were swallowed, give water to drink and get medical advice.

Skin Contact:

Not expected to require first aid measures. Wash exposed area with soap and water. Get medical advice if irritation develops.

Eye Contact:

Not expected to require first aid measures. Wash thoroughly with running water. Get medical advice if irritation develops.

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5. Fire Fighting Measures

Fire:

Not considered to be a fire hazard.

Explosion:

Not considered to be an explosion hazard.

Fire Extinguishing Media:

Use any means suitable for extinguishing surrounding fire.

Special Information:

Use protective clothing and breathing equipment appropriate for the surrounding fire.

---

6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Contain and recover liquid when possible. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

---

7. Handling and Storage

Keep in a tightly closed container, stored in a cool, dry, ventilated area. Protect against physical damage. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
None established.
Ventilation System:
In general, dilution ventilation is a satisfactory health hazard control for this substance. However, if conditions of use create discomfort to the worker, a local exhaust system should be considered.
Personal Respirators (NIOSH Approved):
Not expected to require personal respirator usage.
Skin Protection:
Wear protective gloves and clean body-covering clothing.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Yellow liquid.
Odor:
Odorless.
Solubility:
Complete (100%)
Specific Gravity:
No information found.
pH:
7.0
% Volatiles by volume @ 21C (70F):
ca. 98
Boiling Point:
No information found.
Melting Point:
No information found.
Vapor Density (Air=1):
Not applicable.
Vapor Pressure (mm Hg):
Not applicable.
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Oxides of phosphorous, sodium and carbon may be formed when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
No information found.
Conditions to Avoid:
No information found.

11. Toxicological Information

--------\Cancer Lists\----------

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Potassium Phosphate Monobasic (7778-77-0)	No	No	None
Sodium Phosphate, Dibasic (7558-79-4)	No	No	None
Propylene Glycol (57-55-6)	No	No	None
FD & C Yellow No. 5 (1934-21-0)	No	No	None
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:
No information found.
Environmental Toxicity:
No information found.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste disposal facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations.

Dispose of container and unused contents in accordance with federal, state and local requirements.

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14. Transport Information

Not regulated.

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15. Regulatory Information

--------\Chemical Inventory Status - Part 1\---------------------------------

Ingredient	TSCA	EC	Japan	Australia
Potassium Phosphate Monobasic (7778-77-0)	Yes	Yes	Yes	Yes
Sodium Phosphate, Dibasic (7558-79-4)	Yes	Yes	Yes	Yes
Propylene Glycol (57-55-6)	Yes	Yes	Yes	Yes
FD & C Yellow No. 5 (1934-21-0)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

--------\Chemical Inventory Status - Part 2\---------------------------------

		--Canada--		
Ingredient	Korea	DSL	NDSL	Phil.
Potassium Phosphate Monobasic (7778-77-0)	Yes	Yes	No	Yes
Sodium Phosphate, Dibasic (7558-79-4)	Yes	Yes	No	Yes
Propylene Glycol (57-55-6)	Yes	Yes	No	Yes
FD & C Yellow No. 5 (1934-21-0)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

--------\Federal, State & International Regulations - Part 1\----------------

	-SARA 302-		------SARA 313------	
Ingredient	RQ	TPQ	List	Chemical Catg.
Potassium Phosphate Monobasic (7778-77-0)	No	No	No	No
Sodium Phosphate, Dibasic (7558-79-4)	No	No	No	No
Propylene Glycol (57-55-6)	No	No	No	No
FD & C Yellow No. 5 (1934-21-0)	No	No	No	No
Water (7732-18-5)	No	No	No	No

--------\Federal, State & International Regulations - Part 2\----------------

		-RCRA-	-TSCA-
Ingredient	CERCLA	261.33	8(d)
Potassium Phosphate Monobasic (7778-77-0)	No	No	No
Sodium Phosphate, Dibasic (7558-79-4)	5000	No	No
Propylene Glycol (57-55-6)	No	No	No
FD & C Yellow No. 5 (1934-21-0)	No	No	No
Water (7732-18-5)	No	No	No

```
Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  No
SARA 311/312:  Acute: No       Chronic: No   Fire: No  Pressure: No
Reactivity: No          (Mixture / Liquid)
```

Australian Hazchem Code: None allocated.
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

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16. Other Information

NFPA Ratings: Health: **0** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
As part of good industrial and personal hygiene and safety procedure, avoid all unnecessary exposure to the chemical substance and ensure prompt removal from skin, eyes and clothing.
Label Precautions:
None.
Label First Aid:
Not applicable.
Product Use:
Laboratory Reagent.
Revision Information:
No Changes.

HANNA® instruments

HI 7031

Conductivity Calibration Solution, 1413 µS/cm @ 25°C/77°F

Safety Data Sheet

According to Regulation (EC) No. 1907/2006

RS REACh revision date 01/07/10

Revision Date: 2008-12-01

Reason for Revision: REACH Compliance and General Update

SD0432 v2.3 RS 410-0924, 484-8755, 766-902

SECTION 1: IDENTIFICATION OF THE PRODUCT AND COMPANY

Product Name: HI 7031 Conductivity Calibration Solution

Application: For calibrating electrodes. 1413 µS/cm @ 25°C/77°F

Additional Product Codes: HI 7031/1G HI 7031L HI 7031L/C HI 7031M HI 7031/120ML

Supplied by:
RS Components Ltd,
Birchington Road, Corby, Northants, NN17 9RS.
Tel: +44 (0) 1536 402888 (8am to 8pm)
Email: technical.help@rs-components.com

Company Information (USA): Hanna Instruments, Inc.
584 Park East Dr, Woonsocket, Rhode Island, USA 02895

Technical Service Contact Information: 1-800-426-6287 (8:30AM - 5:00PM ET)
+1-401-766-4260 (8:30AM - 5:00PM ET)

USA Emergency Contact Information: 1-800-424-9300 (Chemtrec 24Hr. Emergency)

International Emergency Contact Information: +1-703-527-3887 (Chemtrec 24Hr. Emergency)

E-mail Address: tech@hannainst.com

SECTION 2: HAZARD IDENTIFICATION

Non-hazardous product as specified in Directives 67/548/EEC and 1999/45/EC.

SECTION 3: COMPOSITION AND COMPONENT INFORMATION

Component: Aqueous Solution

EC-No.:

CAS-No.:

Hazard:

Phrases:

Content:

SECTION 4: FIRST AID MEASURES

After Inhalation: Remove to fresh air. Call a physician if breathing becomes difficult.

After Skin Contact: Wash effected area with water and soap.

After Eye Contact: Rinse out with plenty of water for at least 15 minutes. If pain persists, summon medical advice.

After Swallowing: Wash out mouth with plenty of water, provided person is conscious. Obtain medical attention if feeling unwell.

General Information: Not available

SECTION 5: FIRE-FIGHTING MEASURES

Suitable Extinguishing Media:

Water Spray, Foam, Dry Powder, Carbon Dioxide

Special Risks:

Non-combustible.

Special Protective Equipment:

Do not stay in dangerous zone without suitable chemical protection clothing and self-contained breathing apparatus.

Additional Information:

Contain escaping vapors with water.

SECTION 6: ACCIDENTAL RELEASE MEASURES

Personal Precautions:

None

Environmental Precautions:

None

Additional Notes:

None

SECTION 7: HANDLING AND STORAGE

Handling:

No restrictions

Storage:

Keep container closed and protected from direct sunlight. Store at room temperature (+15°C to +25°C).

SECTION 8: EXPOSURE CONTROL/PERSONAL PROTECTION

Ingredients:

Engineering:

Maintain general industrial hygiene practice.

Personal Protective Equipment:

As appropriate to quantity handled.

Respiratory Protection:

Required when vapors/aerosols are generated.

Protective Gloves:

Rubber or plastic

Eye Protection:

Goggles or face mask

Industrial Hygiene:

Change contaminated clothing. Wash hands after working with substance.

SECTION 9: PHYSICAL/CHEMICAL PROPERTIES

Appearance:	Colorless liquid	***Odor:***	Odorless	***Density at 20° C:***	~ 1 g/cm³
Melting Point:	NA	***Boiling Point:***	> 100 °C	***Solubility:***	Soluble
pH at 20° C:	~ 7	***Explosion Limit:***	NA	***Flash Point:***	NA
Thermal Decomp.:	NA				

SECTION 10: STABILITY AND REACTIVITY

Conditions to be Avoided:

Strong Heating (above boiling point). Stable in the recommended storage conditions.

Hazardous Decomposition Products:

In the event of fire: See section 5.

Hazardous Polymerization:

Will not occur.

Substances to be Avoided:

The generally known reaction partners of water

Further Information:

Not available

SECTION 11: TOXICOLOGICAL INFORMATION

Quantitative data on the toxicity of this product is not available.

In Case of Inhalation:

In Case of Skin Contact:

In Case of Eye Contact:

In Case of Ingestion:

Further Data: Hazardous properties cannot be excluded, but are relatively unlikely because of the low concentration of the dissolved substances, when the product is handled appropriately. The product should be handled with the usual care when dealing with chemicals.

SECTION 12: ECOLOGICAL INFORMATION

Quantitative data on the ecological effect of this product is not available.

Further Data: No ecological problems are to be expected when the product is handled and used with due care and attention.

SECTION 13: DISPOSAL CONSIDERATIONS

Waste Disposal: Can be safely disposed of as an ordinary refuse.

SECTION 14: TRANSPORTATION INFORMATION

Land:	*Sea:*	*Air:*
Not subject to transport regulations	Not subject to transport regulations	Not subject to transport regulations

SECTION 15: REGULATORY INFORMATION

Labeling according to EC Directives:

Symbol: Non-hazardous according to Directives 67/548/EEC and 1999/45/EC.

R-phrases:

S-phrases:

Contains:

SECTION 16: OTHER INFORMATION

Text of R-phrases under Section 3

Revision Information

Revision Date:	2008-12-01
Supersedes edition of:	2008-01-17
Reason for revision:	REACH Compliance and General Update

Legend

NA: Not Applicable
ND: Not Determined

THE INFORMATION CONTAINED HEREIN IS BASED ON THE PRESENT STATE OF OUR KNOWLEDGE. IT CHARACTERIZES THE PRODUCT WITH REGARD TO THE APPROPRIATE SAFETY PRECAUTIONS. IT DOES NOT REPRESENT A GUARANTEE OF THE PROPERTIES OF THE PRODUCT.

GATECO OIL COMPANY -- UNLEADED REGULAR GASOLINE -- 9130-00-148-7103

========== Product Identification ==========

Product ID:UNLEADED REGULAR GASOLINE
MSDS Date:01/23/1989
FSC:9130
NIIN:00-148-7103
MSDS Number: BHYBX
=== Responsible Party ===
Company Name:GATECO OIL COMPANY
Address:2200 EAST BESSEMER AVENUE
City:GREENSBORO
State:NC
ZIP:27405
Country:US
Info Phone Num:919-273-8663
Emergency Phone Num:919-273-8663
CAGE:0MH29
=== Contractor Identification ===
Company Name:GATECO OIL COMPANY
Address:2200 EAST BESSEMER AVENUE
Box:City:GREENSBORO
State:NC
ZIP:27405
Country:US
Phone:919-273-8663
CAGE:0MH29

========== Composition/Information on Ingredients ==========

Ingred Name:GASOLINE
CAS:8006-61-9
RTECS #:LX3300000
Fraction by Wt: 100%
Other REC Limits:NONE SPECIFIED
OSHA PEL:300 PPM/500 STEL
ACGIH TLV:300 PPM/500STEL;9192

Ingred Name:BENZENE (SARA III)
CAS:71-43-2
RTECS #:CY1400000
Fraction by Wt: 2%
Other REC Limits:NONE SPECIFIED
OSHA PEL:1PPM/5STEL;1910.1028
ACGIH TLV:10 PPM; A2; 9192
EPA Rpt Qty:10 LBS
DOT Rpt Qty:10 LBS

Ingred Name:TOLUENE (SARA III)
CAS:108-88-3
RTECS #:XS5250000
Fraction by Wt: 8%
Other REC Limits:NONE SPECIFIED
OSHA PEL:200 PPM/150 STEL
ACGIH TLV:50 PPM; 9293
EPA Rpt Qty:1000 LBS
DOT Rpt Qty:1000 LBS

Ingred Name:XYLENES (O-,M-,P- ISOMERS) (SARA III)
CAS:1330-20-7
RTECS #:ZE2100000
Fraction by Wt: 10%
Other REC Limits:NONE SPECIFIED
OSHA PEL:100 PPM/150 STEL
ACGIH TLV:100 PPM/150STEL;9192
EPA Rpt Qty:1000 LBS
DOT Rpt Qty:1000 LBS

Ingred Name:ETHYL BENZENE (SARA III)
CAS:100-41-4
RTECS #:DA0700000
Fraction by Wt: 1%
Other REC Limits:NONE SPECIFIED
OSHA PEL:100 PPM/125 STEL
ACGIH TLV:100 PPM/125STEL 9192
EPA Rpt Qty:1000 LBS
DOT Rpt Qty:1000 LBS

Ingred Name:TRIMETHYL BENZENE (SARA III)
CAS:25551-13-7
RTECS #:DC3220000
Fraction by Wt: 2%
Other REC Limits:NONE SPECIFIED
OSHA PEL:25 PPM
ACGIH TLV:25 PPM; 9192

Ingred Name:METHYL TERT-BUTYL ETHER (SARA III)
CAS:1634-04-4
RTECS #:KN5250000
Fraction by Wt: 8%
Other REC Limits:NONE SPECIFIED
EPA Rpt Qty:1 LB
DOT Rpt Qty:1 LB

========== Hazards Identification ==========

Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES
Reports of Carcinogenicity:NTP:YES IARC:YES OSHA:YES
Health Hazards Acute and Chronic:PRODUCT IS MILDLY IRRITATING TO BODY TISSUES. IT MAY PRODUCE CENTRAL NERVOUS SYSTEM DEPRESSION, AND PROLONGED AND/OR REPEATED CONTACT MAY CAUSE DERMATITIS.
Explanation of Carcinogenicity:PRODUCT CONTAINS BENZENE, LISTED BY NTP AND IARC. REGULATED BY OSHA.
Effects of Overexposure:EYE:IRRITATION, SKIN:MILD IRRITATION,POSSIBLE DERMATITIS WITH PROLONGED/REPEATED CONTACT. INHALED:RESPIRATORY IRRITATION, NAUSEA, DIZZINESS, HEADACHE. INGESTED:G/I IRRITATION, NAUSEA, VOMITING.
Medical Cond Aggravated by Exposure:PEOPLE WITH A SKIN DISORDER SHOULD USE EXTRA CAUTION TO AVOID SKIN CONTACT WHEN HANDLING OR USING THIS PRODUCT.

========== First Aid Measures ==========

First Aid:EYE:FLUSH W/WATER 15 MIN, HOLD LIDS OPEN. SKIN:WASH WITH SOAP & WATER. REMOVE CONTAMINATED CLOTHING AND LAUNDER BEFORE REUSE. INHALED:REMOVE TO FRESH AIR. RESTORE BREATHING IF NECESSARY. INGESTED:D O NOT INDUCE VOMITING. GIVE 2 LARGE GLASSES OF MILK OR WATER AND GET IMMEDIATE MEDICAL CARE. GIVE NOTHING BY

MOUTH IF UNCONSCIOUS. IF IRRITATION PERSISTS OR IS SEVERE,SEE A DOCTOR.

========== Fire Fighting Measures ==========

Flash Point Method:TCC
Flash Point:-45F,-43C
Lower Limits:1.3
Upper Limits:6.0
Extinguishing Media:USE WATER FOG, CARBON DIOXIDE, FOAM, OR DRY CHEMICAL.
Fire Fighting Procedures:FIRE FIGHTERS SHOULD USE NIOSH APPROVED SCBA & FULL PROTECTIVE EQUIPMENT WHEN FIGHTING CHEMICAL FIRE. USE WATER SPRAY TO COOL NEARBY CONTAINERS EXPOSED TO FIRE.
Unusual Fire/Explosion Hazard:WATER STREAM WILL SCATTER FIRE. VAPORS ARE VERY EXPLOSIVE.

========== Accidental Release Measures ==========

Spill Release Procedures:MINOR: ABSORB MATERIAL WITH CLAY, VERMICULITE, OR SIMILAR ABSORBENT MATERIAL. PLACE IN DISPOSAL CONTAINERS. MAJOR: DIKE & CONTAIN SPILL. ELIMINATE SOURCES OF IGNITION. SHUT OFF LEAKS. REMOVE LIQUID BY VACUUM OR ABSORBENT.

========== Handling and Storage ==========

Handling and Storage Precautions:STORE IN A COOL, VENTILATED WORK AREA. KEEP CONTAINERS CLOSED WHEN NOT IN USE. DETACHED STORAGE IS PREFERABLE.
Other Precautions:'EMPTY' CONTAINERS MAY CONTAIN RESIDUE OR VAPOR. TREAT THEM WITH THE RESPECT DUE FULL ONES. DO NOT CUT,WELD,ETC. ON THEM. GROUND CONTAINERS BEFORE TRANSFERRING LIQUID. AVOID HAVING OPEN ELECTRICAL EQ UIPMENT IN VAPOR AREAS.

========== Exposure Controls/Personal Protection ==========

Respiratory Protection:RESPIRATOR WILL NOT NORMALLY BE NECESSARY. USE NIOSH/MSHA APPROVED AIR SUPPLIED RESPIRATOR OR RESPIRATOR FOR ORGANIC VAPOR IF EXPOSURE IS ABOVE THE TLV/PEL. SEE 29 CFR 1910.134 FOR REGULATIONS PERTAI NING TO RESPIRATOR USE.
Ventilation:LOCAL AND MECHANICAL EXHAUST RECOMMENDED.
Protective Gloves:NEOPRENE, NITRILE, OR POLYVINYL ALCOHOL
Eye Protection:USE CHEMICAL SAFETY GOGGLES & FACESHIELD
Other Protective Equipment:EYE WASH STATION & SAFETY SHOWER.
Work Hygienic Practices:USE GOOD CHEMICAL HYGIENE PRACTICES. AVOID PROLONGED/REPEATED CONTACT. DO NOT EAT, DRINK OR SMOKE IN WORK AREA.
Supplemental Safety and Health
CODE MUR. ON HIS LABEL, MFR LISTS SPECIFICATION AS ASTM D-439.

========== Physical/Chemical Properties ==========

HCC:F2
Boiling Pt:B.P. Text:82.0F,27.8C
Vapor Pres:10-15 MM
Vapor Density:3.0 - 4.0
Spec Gravity:0.72 - 0.74
Solubility in Water:NEGLIGIBLE
Appearance and Odor:CLEAR LIQUID, GASOLINE ODOR
Percent Volatiles by Volume:100

========== Stability and Reactivity Data ==========

Stability Indicator/Materials to Avoid:YES
STRONG OXIDIZING AGENTS
Stability Condition to Avoid:HIGH TEMPERATURES, SPARKS, AND OPEN FLAMES
Hazardous Decomposition Products:CARBON MONOXIDE, CARBON DIOXIDE AND OTHER HYDROCARBON COMPOUNDS DURING COMBUSTION.

========== Disposal Considerations ==========

Waste Disposal Methods:DISPOSE I/A/W ALL FEDERAL, STATE AND LOCAL REGULATIONS. MANUFACTURER SUGGESTS THAT DISPOSAL MAY BE DONE BY INCINERATION.

APPENDIX B

QUALITY ASSURANCE PROJECT PLAN (QAPjP)

APPENDIX B
QUALITY ASSURANCE PROJECT PLAN
PREFERRED ELECTRIC MOTORS CO SITE

This Site-specific Quality Assurance Project Plan (QAPjP) identifies sections of MACTEC's NYSDEC Program Quality Assurance Program Plan (QAPP) (MACTEC, 2007) that apply to the activities described in this Field Activities Plan (FAP), describes variances to those procedures, and specifies the analytical methods to be used for laboratory analysis of environmental samples.

General Procedures. The general procedures used to conduct the remedial investigation FAP at the Preferred Electric Motors Site will be taken from the following sections of the QAPP:

Section 2.0	Program Organization and Responsibilities
Section 6.0	Calibration Procedures
Section 7.0	Analytical Program
Section 8.0	Data Reduction, Validation, and Reporting
Section 9.0	Internal Quality Control
Section 10.0	Audits
Section 11.0	Preventive Maintenance
Section 12.0	Data Assessment
Section 13.0	Corrective Action
Section 14.0	Reports to Management

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

QA/QC Procedures	Section 3.0
Decontamination	Subsection 4.3
Sample Handling & Custody	Subsections 4.5 and 5.0
Low Flow Groundwater Sampling	Subsection 4.5.4.3
Soil Vapor, Indoor, and Ambient Air Sampling	Subsections 4.5.1.3, 4.5.6, 4.5.7 and 4.5.8
Field Instrument Calibration	Section 6.0

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

- IDW procedures for disposal of purge water – monitoring well water purged prior to groundwater sampling will be placed in USDOT approved 55-gallon containers and stored on Site for proper disposal. During monitoring well purging techniques prior to sampling, if photoionization detector (PID) readings are below background levels and if no visual and olfactory signs of contamination are noted, water will be considered non-hazardous and will be allowed to infiltrate into the ground surface at the sampling location.

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

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

Sample Type	**Nomenclature Sequence**	**Example ID**
Monitoring Well Groundwater	DEC ID# - GW ID –Depth – Round - QC	828106-MW002___01XX
Sub-Slab Soil Vapor	DEC ID# - SV ID – Location ID – Event	828106-SV-FE019-01
Indoor Air	DEC ID# - IA ID – Location ID – Event	130056-IA- FE019-01
Ambient Air	DEC ID# - AA ID – Location ID – Event	130056-AA- FE019-01

MW = monitoring well SV = soil vapor IA = Indoor Air AA = Ambient Air

REFERENCES

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

New York State Department of Environmental Conservation (NYSDEC), 2005. "*Analytical Services Protocols"*; 6/05 Edition; June 2005.

New York State Department of Environmental Conservation (NYSDEC), 2002. Draft DER-10, Technical Guidance for Site Investigation and Remediation. December 2002.

U.S. Environmental Protection Agency (USEPA), 1987. "Data Quality Objectives for Remedial Response Activities"; Office of Emergency and Remedial Response and Office of Waste Programs Enforcement; Washington DC; EPA/540/G-87/003; March 1987.

Table B-1:

Analytical DQO Levels

Parameter	Use	Data Quality Level
PH, Dissolved Oxygen, Temperature, Specific Conductance, Turbidity	Provides physical and chemical data on groundwater samples for use during sampling collection.	Level I
PID field screening	Provides qualitative real-time information on air quality in the breathing zone for health and safety decisions, and to identify potentially contaminated groundwater, soil, and soil gas.	Level I
TCL VOCs	Provides analytical information to compare to standards and guidance values.	Level III 8260B (groundwater) TO-15 (soil vapor, indoor air, ambient air)
TCLP/Waste Characterization – as needed	Provides analytical information to compare to standards and guidance values.	Level III 8260B, 6010B/7470A, Characteristics – as needed

Notes:
TCL = target compound list
VOCs = volatile organic compounds
TCLP = toxicity characteristics leaching procedure