FINAL
FIELD ACTIVITIES PLAN
DINABURG DISTRUBUTING, INC.
SITE NO. 828103

WORK ASSIGNMENT NO. D004434-17

Prepared for:

New York State Department of Environmental Conservation
Albany, New York

Prepared by:

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

MACTEC: 3612082107

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GLOSSARY OF ACRONYMS AND ABBREVIATIONS

bgs	below ground surface
cm/sec	centimeter(s) per second
Dinaburg	Dinaburg Distributing, Inc.
ELAP	Environmental Laboratory Approval Program
°F	degrees Fahrenheit
FAP	Field Activities Plan
FS	Feasibility Study
ft/d	feet per day
ft/ft	feet per foot
HASP	Health and Safety Plan
IDW	Investigation derived waste
IRM	Interim remedial measure
K	hydraulic conductivity
MACTEC	MACTEC Engineering and Consulting, P.C.
msl	mean sea level
MPE	Multi-phase extraction
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDEC	New York State Department of Health

GLOSSARY OF ACRONYMS AND ABBREVIATIONS (CONTINUED)

PCE	1,1,2,2-tetrachloroethylene
PID	photoionization detector
ppm	parts per million
PVC	polyvinyl chloride
QAPjP	Quality Assurance Project Plan
QAPP	Quality Assurance Program Plan
RI	Remedial Investigation
Site	Dinaburg Distributing, Inc. site
SVE	Soil vapor extraction
TCE	Trichloroethylene
URS	URS Corporation
USDOT	United States Department of Transportation
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 Draft Field Activities Plan (FAP) for the Dinaburg Distributing, Inc. (Dinaburg) site (Site) located in the City of Rochester, Monroe County, New York. The Site, Site No. 8-28-103, is listed as a Class 2 hazardous waste site, in the Registry of Hazardous Waste Sites in New York State (NYS). This Work Plan has been prepared in accordance with the NYSDEC requirements in Work Assignment (WA) No. D004434-17 dated July 3, 2008 (NYSDEC, 2008), and with the April 2005 Superfund Standby Contract No. 4434 between MACTEC and the NYSDEC.

This FAP was prepared in accordance with the Site's Project Management Work Plan (MACTEC, 2008) and includes details regarding the proposed field activities scheduled for the spring of 2009, including a Site-specific Health and Safety Plan (HASP) and a Quality Assurance Project Plan (QAPjP).

This FAP is organized into four sections as follows:

- Section 1.0 – Introduction, Work Objectives, and Site Background;
- Section 2.0 – Site Physical Setting;
- Section 3.0 – Scope of Work, Field Activity Details; and
- Section 4.0 – References.

1.1 WORK ASSIGNMENT OBJECTIVES

Based on the WA and discussions with the NYSDEC project manager, Matthew Dunham, the primary objective is to evaluate the nature and extent of soil and groundwater contamination in the vicinity of the Site. There are several data gaps based on soil and groundwater data collected to date, including the groundwater flow direction from the source area, and the concentrations of contaminants in shallow overburden and the overburden/bedrock interface zone south of the Site. Another objective is to evaluate the potential for the chlorinated solvents present in the groundwater to off-gas to soil vapor in the vicinity of the Site.

In addition, the field program will evaluate the effectiveness of the existing multi-phase extraction (MPE) system at the Site. Current data was not sufficient to determine the radius of influence of the soil vapor or groundwater portions of the extraction system.

The objectives of the field program are described in more detail in Section 3.

1.2 SITE BACKGROUND

Information pertaining to the history of the Site is contained in past reports. This information was reviewed and summarized in the following subsections.

1.2.1 Site Description

The Site is located at 1012 South Clinton Avenue in the City of Rochester in Monroe County, New York (Figure 1.1). The property is located in a mixed commercial/residential area just inside the Rochester City limits. The Site occupies approximately 0.25 acres on two parcels aligned perpendicular to one another, and is currently surfaced by a combination of pavement, a concrete former building slab, and soil. The property is currently vacant with several residential and commercial properties located nearby.

1.2.2 Site History

The property and buildings were reportedly used as an automobile repair shop from around 1950 through approximately 1969. From 1971 to 1993, the Site was occupied by Dinaburg, which operated a dry cleaning supply company business and sold chemical solvents to various dry cleaners in the area (Sears Brown Group, 1995a). Dinaburg stored trichloroethylene (TCE) and 1,1,2,2-tetrachloroethylene (PCE) in above ground storage tanks located inside the north section of the Site building (URS Corporation [URS], 2001). As a result of Site operations, spills and or leaks of chlorinated solvents occurred to the ground surface (anticipated both within and outside the Site buildings). The property has been vacant since 1995 and currently consists of a parking lot. The building and an adjacent house at 350 Benton Street were demolished in 2004 (URS, 2004b).

A voluntary site investigation was completed in 1998 by the estate of Saul Dinaburg. On-Site soils and groundwater were found to be contaminated with TCE, PCE, and their breakdown products. TCE and PCE were found in the groundwater at concentrations up to 93 parts per million (ppm) and 33 ppm, respectively. A second investigation completed in 1999 encountered total volatile organic compounds (VOCs) at concentrations of up to 1% in the soil, and revealed that solvent vapors were migrating from the Site and into the basements of nearby homes. Indoor air samples in two of these homes contained PCE at levels above 100 milligrams per cubic meter (mg/M^3) (the indoor air guideline concentration for PCE in New York is 100 mg/M^3).

Attempts to remediate the Site under the voluntary agreement program were unsuccessful and the agreement was terminated in 1999. Later that year, the NYSDEC installed two off-Site soil vapor extraction (SVE) systems under the Interim remedial measure (IRM) program to address the migration of solvent vapor contamination into the nearby basements. Additional soil investigations completed in 1999 confirmed the presence of TCE and PCE contamination in nearby off-Site areas. A Remedial Investigation (RI) was completed by URS in 2001 and a MPE was designed and constructed as an IRM. Construction of the IRM began in the fall of 2005 and was completed in 2006. Operation of the MPE system (a groundwater and SVE system) began in April, 2006 and is currently ongoing (MACTEC, 2009).

2.0 SITE PHYSICAL SETTING

The physical characteristics of the Site study area are presented in this section.

2.1 SURROUNDING LAND USE

The Site is zoned as commercial and residential and is situated in a combined commercial/residential area within the City of Rochester. Several small businesses including restaurants, a barbershop, a tool rental shop and a convenience store are located near the Site on South Clinton Avenue. Residences with detached garages are situated on small lots along Caroline Street to the north and along Benton Street to the south and east of the Site.

2.2 TOPOGRAPHY

The Site is located approximately 6,000 feet east of the Genesee River and approximately 1,000 feet north of the Pinnacle Hills, which are between 100 to 200 feet higher in elevation than the Site. The Site topography is nearly flat-lying with the elevation of the Site being approximately 515 feet above mean sea level (msl). Surface water run-off is collected by the storm water/sewer system underlying the adjacent streets, with the Site itself having a slight slope down towards the streets in the southwest and southeast directions.

2.3 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 71°F in July. Average annual precipitation is 34 inches. Average annual snowfall is 96 inches (National Climatic Data Center, 2004: for the period of 1971-2000, http://www.ncdc.noaa.gov/oa/ncdc.html).

2.4 GEOLOGY

The geology and hydrogeology at the Site were characterized by the installation of a number of soil borings and groundwater wells during the various Site investigations.

2.4.1 Regional Geology

The Site is located within the Erie-Ontario Lowlands Physiographic Province of NYS within which low plains with little relief characterize the province. The glaciated topography is an expression of nearly flat-lying sedimentary rock formations covered by glaciolacustrine deposits and till. Kame moraine deposits are found in the Pinnacle Hill located south of the Site. The bedrock structure is homoclinal with a gentle southerly dip into the Appalachian Basin. The bedrock is gently deformed with some scattered, small folds and faults (URS, 2001).

2.4.2 Site Stratigraphy

The Site is underlain by approximately 20 to 25 feet of overburden overlying Silurian age dolostone bedrock. The overburden consists of man-made fill overlying glacial deposits. The glacial deposits are underlain by a weathered bedrock zone of variable thickness, referred to by URS as the overburden/bedrock interface zone.

The fill material consists of re-worked silty sand and contains gravel, bricks, concrete and wood. The fill material ranges in thickness from zero to approximately eight feet in and immediately around the Site, and, where present, overlies glaciolacustrine sediments.

URS characterized the glacial deposits at the Site as a combination of both lodgment tills (till) and glaciolacustrine (lacustrine) sediments. The till at the Site lies immediately above the overburden/bedrock interface (weathered bedrock) zone. The stratified lacustrine sediments lie upon the till and do not appear to contact the overburden/bedrock interface zone. The lacustrine sediments were differentiated from the till based on the presence of alternating thin beds of clayey silt and sand observed in soil borings at the Site.

URS states that, in general, the glacial deposits at the Site consist of clayey silt, sandy silt and silty clay interbedded with thin sand layers. Within the lacustrine sediments the sandier seams range in thickness between a few inches and a few feet. At depth the glacial deposits consist of angular dolostone fragments in a silty clay (till) with occasional boulders. URS reported that a gravelly weathered bedrock (overburden/bedrock interface zone) is present atop competent bedrock and that the

glacial units are generally continuous across the Site, with some lateral variability in grain size composition.

Bedrock at the Site consists of a low relief Silurian age dolostone of the Lockport Group, which URS described as medium gray, hard, fine to medium grained, mostly featureless or with some zones of wavy carbonaceous laminae. URS reports that there are a few scattered zones that contain vugs (small cavities) or smaller "pinpoints" of dissolution porosity, along with some white calcite and galena secondary mineralization observed in a few scattered zones. The recovered core samples were reported as being generally broken with rock quality designations ranging from 13 to 56 percent (very poor to fair rock quality.

2.5 GROUNDWATER HYDROLOGY

URS reports that groundwater at the Site exists in both unconsolidated overburden and consolidated bedrock water-bearing units. Further, the overburden water-bearing units exhibit unconfined and semi-confined properties that are distinguished by differences in their geology, hydraulic conductivities and water level elevations. Groundwater is generally encountered from approximately five to 10 feet below ground surface (bgs) (URS, 2001).

Conceptually, URS characterized three local water-bearing units below the Site. From top (ground surface) to bottom, the units consist of 1) a glacial deposit (lacustrine and till) unit, 2) an overburden/weathered bedrock interface unit, and 3) a bedrock unit. Fill material, where present, was reported to exist primarily within the vadose zone. Existing monitoring well construction data is presented in Table 2.1.

2.5.1 Glacial Deposit Unit

The glacial deposits, consisting of silt, clay, sand and gravel, are between 20 to 25 feet thick with saturated conditions starting between five feet bgs to 10 feet bgs. This unit was further subdivided by URS into an upper stratified lacustrine layer and a lower lodgment till layer. The lodgment till was typically encountered between 10 and 13 feet bgs.

The lacustrine zone consists of discrete layers, seams and lenses of clayey silt and silty sand. Discontinuous perched groundwater lenses were identified in sand seams within the upper lacustrine layer and are represented by water level measurements in monitoring well MW-01A, which appears to fluctuate over time and at times appears to be "dry". Observations such as these are characteristic of a well that is screened in a perched water zone (URS, 2001).

The lodgment till is characterized by unstratified silty clay with varying amounts of sand and gravel. The lodgment till was observed as being a semi-confining layer (or aquitard) to the interface and bedrock units immediately below it. An aquitard is defined as a confining bed that retards but does not prevent the flow of water to or from an adjacent aquifer; a leaky confining bed.

2.5.2 Overburden/Weathered Bedrock Interface

URS described this interface unit as a thin, semi-confined aquifer with a relatively high hydraulic conductivity (K) when compared to the units above and below it. This unit consists of sand and gravel-sized weathered bedrock with varying amounts of silt, clay and cobbles. The thickness of this unit was found to range from less than one foot (MW-08K) to approximately 5 feet (MW-09K) and generally increases in thickness to the northwest and south. URS referred to this unit as the overburden/bedrock interface zone.

2.5.3 Bedrock Unit

The bedrock located below the Site is a fossiliferous dolostone of Silurian age. Previous reports (Sear-Brown, 1995a and 1998) described the existence of dislocated and rotated slabs of bedrock, based on steeply dipping laminae observed in the MW-03C rock core and "the highly localized variation in auger refusal" observed during drilling. The presence of dislocated and rotated slabs of bedrock may explain the unexpectedly high bedrock elevation encountered at RW-01. Of the borings installed to date, only MW-03C was installed deeper than the top of competent rock.

URS stated that although the upper bedrock unit as characterized by MW-3C had a hydraulic conductivity (K) of 8.2×10^{-4} cm/sec, for the purposes of pumping test data analysis, the bedrock unit as a whole was modeled as an aquiclude, i.e., a low-permeability unit that forms a boundary to the local groundwater flow system. URS further states that it is likely that the boundary is less than absolute.

2.6 GROUNDWATER HYDROLOGY

The K's of the glacial deposits and bedrock were not directly investigated by URS for their RI Report (URS, 2001) but were previously estimated in the 1998 Sear-Brown report based on an analysis of grain-size distributions and slug test data (Sear-Brown, 1998). Sear-Brown calculated the following representative K's for the three units at the Site:

- Glacial Deposits: $K = 2.5x10^{-4}$ centimeters per second (cm/sec), or 0.71 feet per day (ft/d)
- Overburden/Weathered Bedrock Interface: $K = 5.9x10^{-3}$ cm/sec, or 16.7 ft/d
- Bedrock: $K = 8.2x10^{-4}$ cm/sec, or 2.3 ft/d

For URS's RI report (URS, 2001), the K of the overburden/weathered bedrock interface unit was calculated from data recorded during a 72-hour pumping test. The calculated K value for this unit was presented as 4.2×10^{-3} cm/sec (12 ft/d), which correlates well with Sear-Brown's previous estimate based on slug test data.

2.6.1 Groundwater Flow

In URS's RI report (URS, 2001), for the interpolation of groundwater contours, monitoring wells were divided into two groups; glacial deposit wells and overburden/bedrock interface wells, based on whether the well screen intersected the overburden/bedrock interface unit. Wells categorized as glacial deposits wells are GPW-01, GPW-02, MW-02, MW-08S, MW-09S, MW-10S, and MW-11S; those categorized as overburden/bedrock interface wells are MW-01, MW-03, MW-04, MW-05 MW-06, MW-08K, MW-09K, MW-10K, MW-11K PZ-01, PZ-02, and RW-01. Wells MW-01A and MW-03C were not included in either the glacial deposit or overburden/bedrock interface groups because MW-01A is screened in a perched zone and MW03C is screened in bedrock only.

URS indicated that the natural flow of groundwater west and south of the Site is likely intercepted by the sewer line bedding, causing a preferential flow of groundwater along the path of the sewer. The local storm/sanitary sewer lines/inlets are reportedly below the top of groundwater south of the Site along Benton Street and west of the Site along South Clinton Avenue. Based on sewer installation

drawings from the late 1800's, the sewers are lined in cement. The permeability of the sewer line bedding is not known, but may be greater than the permeability of native glacial soils.

The direction of local groundwater flow was interpreted by URS to be from the east and northeast to the west, southwest and southeast (as influenced by the local sewer system) in both the shallow glacial deposits and the deep overburden/bedrock interface units. The hydraulic gradient in the glacial deposits were calculated to range between 0.006 feet per foot (ft/ft) and 0.02 ft/ft, with the horizontal hydraulic gradient in the interface unit reported at around 0.02 ft/ft. Vertical flow observations indicated a significant downward gradient based on monitoring well pair measurements. Vertical hydraulic gradients were calculated by URS that range between 0.13 ft/ft in the MW-09 S/K well pair and 0.87 ft/ft in the MW-11 S/K well pair. URS suggested that the high vertical gradients may be interpreted to indicate that the flow rate or "connectiveness" between units is low.

2.7 GROUNDWATER USE

The Site and surrounding area is serviced by public water. The nearest body of surface water is the northward flowing Genesee River which is located approximately 6,000 feet west of the Site.

3.0 SCOPE OF WORK

This FAP has been developed to address data gaps identified in the Draft RI/ Feasibility Study (FS) (MACTEC, 2009). The components included in the scope of work include:

- Installation of four monitoring wells
- Groundwater sampling of the four new wells and 12 existing wells
- Completion of six Geoprobe groundwater points and collection of 12 groundwater samples
- Collection of three exterior soil vapor samples
- Collection of one sub-slab soil vapor sample
- Collection of water level measurement
- Collection of vacuum measurements from the MPE system
- Completion of 10 Geoprobe soil points between the MPE wells
- Installation of 10 microwells in the above mentioned Geoprobe soil points
- Completion of four Geoprobe soil points north of the Site
- Collection of water samples from eight sewer man ways

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 analytical program is provided in Table 3.2. Proposed sample locations are shown on Figure 3.1.

3.1 FIELD OPERATIONS

Companion documents to this FAP that will govern the execution of the field exploration activities include MACTEC's Program Quality Assurance Program Plan (QAPP) (MACTEC, 2007) and HASP (MACTEC, 2005). In addition to these program documents, Appendix A provides details related to health and safety for on-Site activities as presented in the Site-specific HASP.

Subcontractors chosen to support the field activities include:

- Columbia Analytical Services – NYSDEC Environmental Laboratory Approval Program (ELAP) certified laboratory for the analysis of soil and groundwater samples;
- Centek Labs – NYSDEC ELAP certified laboratory for the analysis of soil vapor samples; and

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

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 that the RI 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 New York State Department of Health Community Air Monitoring Plan will also be followed and is included in Appendix A.

3.1.2 Mobilization

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

3.2 SITE INVESTIGATION ACTIVITIES

The flowing subsections detail the specific field investigation activities proposed for the Site under this FAP and the rationale for the proposed activities.

3.2.1 Groundwater Monitoring Well Installation

The existing Site monitoring well network has several data gaps; there are no monitoring points south of the Site; there are no interface wells on the east side of the Site; and, the contamination boundary in the interface zone on the west side of the Site is not confirmed (PCE was detected at interface well GWE-1 at 2,400 µg/L, but was not detected in MW-1, located approximately 10 feet west of GWE-1).

To fill these data gaps and evaluate the presence of VOCs in the deep overburden/shallow bedrock (i.e. interface zone) groundwater around the perimeter of the Site, three two-inch interface zone monitoring wells (MW-12K, MW-13 and MW-14) will be installed (Figure 3.1). In addition, the downgradient well will be paired with a shallow overburden well (MW-12S) to determine shallow groundwater concentrations south of the Site, as well as if site contaminants are migrating through the till layer and into the bedrock groundwater. The exact locations of the wells may vary based on property access and/or utility clearance.

Each deep overburden/bedrock interface monitoring well boring will be advanced using hollow stem auger drilling techniques into the top of the weathered bedrock. Soil samples will be collected at five-foot intervals using two-foot split spoons. For each five-foot interval, PID headspace readings, sample description and classification using the Unified Soil Classification System, and drilling observations will be recorded on field data records (QAPP Figures 4-4, 4-6, and 4-7; MACTEC, 2007) and as discussed in Subsection 4.5.2.2 of the QAPP (no analytical soil samples will be collected). Borings will be continued two feet into bedrock using tri-cone trilling techniques.

The shallow overburden and overburden/bedrock monitoring wells will be constructed of 2-inch inside diameter schedule 40 polyvinyl chloride (PVC) with 10-foot well screens and threaded flush joint risers in accordance with Subsection 4.4.4 of the QAPP (MACTEC, 2007). The deep overburden/bedrock interface wells will be constructed so that the well screens are set into the bedrock below the till layer with a bentonite seal within the till such that the wells are hydraulically isolated from the shallow overburden. Conditions encountered in the field may require a five-foot screen be used rather than a 10-foot screen. The shallow overburden monitoring well will be installed with 10-foot screens set just below the water table to an estimated depth of 16 feet bgs. Well screens will have 0.010-inch wide machine slots with # 0 sand pack to two feet above the screen, a two foot bentonite seal above the sand pack and a bentonite chip or bentonite grout backfill to the ground surface. The wells will be completed with a locking cap and a six-inch flush mount steel cover.

3.2.2 Groundwater Monitoring Well Development

Upon completion of monitoring well installations, the newly installed monitoring wells will be developed (no sooner than 24 hours after installation for wells installed with top of screens below the water table) using pump and surge techniques as described in the Section 4.4.4 of the QAPP

(MACTEC, 2007). Well development activities will be documented on a Well Development Record (QAPP Figure 4-9; MACTEC, 2007).

3.2.3 Groundwater Sampling

After monitoring wells have been installed and developed, the newly installed wells and 12 existing monitoring wells will be sampled for VOCs and natural attenuation parameters to get current groundwater data for the Site. Table 3.2 summarizes the sample IDs, analytical parameters, and the analytical methods.

The initial sampling event will be no sooner than two weeks following the development of the monitoring wells. Prior to sampling, a synoptic round of water level measurements will be collected from all existing monitoring wells, MPE wells, groundwater extraction wells, and microwells. In addition wells with historic detections of PCE above 10-milligrams per liter will be checked for product using an oil water interface probe. 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 using a geopump with dedicated sample tubing. 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. Purge water will be screened with a PID and observed for sheens and odors. If no evidence of contamination is detected then the water will be poured on the ground at the well location. If contamination is observed in the development water then the water will be containerized and stored on-Site for future disposal.

Monitoring well sampling activities will be documented using a Low Flow Groundwater Data Record (QAPP Figure 4-16; MACTEC, 2007).

3.2.4 Soil Vapor Sampling

Soil vapor samples are being collected to evaluate if contaminants of concern from the Site are migrating off-Site in the shallow groundwater into the soil vapor and creating a potential exposure pathway via vapor intrusion. The soil vapor samples will be collected from just above the water table

at each location. Groundwater is present at approximately 10 feet bgs but the depth to groundwater is variable across the Site.

A total of three soil vapor samples will be collected near the Site (SV-1 to SV-3), in the down gradient groundwater flow direction. Two soil vapor points (SV-2 and SV-3) will be completed on the south side of Benton Street and one (SV-1) will be located on the west side of Clinton Avenue. The proposed soil vapor sample point locations are shown on Figure 3.1. The soil vapor points are located in approximate down gradient locations, outside of the contaminant source area. The exact locations of the soil vapor points may vary based on property access and/or utility clearance.

Soil vapor samples will be collected using direct push technology as described in the Section 4.5.1.3 of the QAPP (MACTEC, 2007). The Geoprobe® rods will be pushed to approximately six to eight feet bgs, which is anticipated to be immediately above the water table.

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

In addition to the exterior soil vapor samples, one sub-slab soil vapor sample (SV-4) will be collected from below the concrete floor of the business located to the west and adjacent the Site. The sample will be collected by drilling a 3/8-inch diameter hole through the floor and inserting a ¼-inch outside diameter tubing sealed at the floor with bees-wax as outlined in Section 4.5.6.2 of the QAPP (MACTEC, 2007). The sub-slab sample will be collected in an approximate one-liter Summa-type can with over an approximate 20-minute time period (i.e. less than 0.1 liter per minute). The approximate sample location is shown on Figure 3.1.

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

- The identification of commercial or industrial buildings that may use volatile chemicals during normal operations of the facility;
- Outdoor plot sketches will be drawn as needed that include the Site, area streets, neighboring

commercial or industrial facilities (with estimated distance to the Site), outdoor ambient air sample locations (if applicable), and compass orientation (north arrow);

- Local weather conditions (e.g., precipitation, outdoor temperature, barometric pressure, wind speed and direction) should be noted for the past 24 to 48 hours; and
- Pertinent observations, such as odors and readings from field instrumentation.

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

3.2.5 Geoprobe Soil Borings

Source Area Borings. Based on existing data, it is not clear if the contaminant source material is limited to the upper overburden/lacustrine soil, or if it has migrated down to the till layer. To fill this data gap, 10 Geoprobe soil borings (GS-1 to GS-10) will be completed at the Site between the multiphase extraction wells. Figure 3.1 shows the proposed location of the Geoprobe soil borings. Geoprobe borings will be advanced using direct push technology as described in the Section 4.5.1.1 of the QAPP (MACTEC, 2007). Soil samples will be collected from four-foot long 1-to-2 inch diameter core sampler with an acrylic liner. Soil samples will be collected continuously from the ground surface to approximately 16 feet bgs. PID headspace readings will be used to screen soil samples for the presence of VOCs as each soil sample is removed from the sample collection tube. Samples will be described using the Unified Soil Classification System. The sample description and classification, VOC headspace reading, and boring observations will be recorded on the Data Record as discussed in Subsection 4.5.2 of the QAPP. Based on the PID readings and physical evidence such as color or odor, up to 20 soil samples, will be submitted to the off-Site laboratory for VOC analyses. The data will be used to evaluate the vertical distribution of contaminants in the soil and whether the contamination source material is limited to the upper stratified lacustrine soils that overlie the till layer, or whether it has migrated into the till layer. A microwell will be installed at each boring location as described in the following subsection.

Delineation Borings. Based on existing data, it is not clear if the soil contamination is limited to the Site property, or if it extends onto the property to the north of the Site. To fill this data gap, four Geoprobe soil borings (GS-11 to GS-14) will be completed north of the Site in the vicinity of monitoring wells MW-10S and MW-10K (see Figure 3.1). Soil samples will be collected continuously from the ground surface to approximately 16 feet bgs. PID headspace readings will be

used to screen soil samples for the presence of VOCs and samples will be described using the Unified Soil Classification System. Based on the PID readings and physical evidence such as color or odor, up to 8 soil samples, will be submitted to the off-Site laboratory for VOC analyses. The data will be used to evaluate the potential presence of contamination north of the Site, and if present, the horizontal and vertical distribution of contaminants in the overburden north of the Site.

3.2.6 Geoprobe Microwell Installation

The zone of influence of the MPE system on both the soil vapor and water table drawdown is not known. To fill this data gap, 10 microwells will be installed in the "source area borings" noted previously (GS-1 to GS-10) (see Figure 3.1). Each of the Geoprobe source area soil borings described above will be completed with a microwell (microwell numbers will coincide with the GS numbers, but will be labeled as GMW-1 to GMW-10). Figure 3.1 shows the proposed locations of the Geoprobe soil borings/microwell explorations. The microwell will be constructed with 1-inch ID schedule 40 PVC. Well screens will be five feet long with 0.01" slots and set across the water table from approximately 7 to 12 feet bgs. The well screen will extend approximately 2 feet above the water table so that both water level and vacuum measurements can be collected. The water level and vacuum measurements will be used to evaluate the influence of the MPE wells on both the groundwater drawdown and the zone of influence for vapor extraction. The microwells will be backfilled with #0 sand to approximately 2 feet above the screen if possible and sealed with bentonite chips to approximately 1 foot bgs. Microwells will be completed at the surface with a locking cap and a six inch flush mount casing cemented in place.

3.2.7 Geoprobe Groundwater Points

The existing set of monitoring wells does not give sufficient coverage to adequately characterize the limits of the shallow and deep overburden groundwater contamination. To supplement data from the existing and new monitoring wells and to fill these data gaps, geoprobe groundwater points will be completed at six locations around the perimeter of the Site (GW-1 to GW-6). The approximate locations are shown on Figure 3.1. Groundwater grab samples will be collected from depths of approximately 10 feet bgs and 20 feet bgs at each location. The groundwater samples will be collected by using direct push methods to advance a screen sampler to the desired depth and then pulling the casing back to expose the well screen to the formation (or a similar method). Water will be pumped

using a peristaltic pump or a waterra foot valve type pump. One tubing volume of water will be purged and one set of groundwater parameters including temperature, conductivity, pH, and turbidity will be collected before sampling, if possible. Groundwater grab samples for VOC analysis will be collected at a low purge rate (approximately 100 milliliters per minute) from each depth at each location to characterize the groundwater potentially migrating off Site and to evaluate the potential for vapor to migrate from the shallow groundwater to the vadose zone soils. Direct push sampling techniques are described in Section 4.5.1 of the QAPP (MACTEC, 2007).

3.2.8 Water Level and Vacuum Measurements

A round of water levels will be collected from all the MPE wells, the new microwells and the monitoring well network while the MPE system is operating. These water level measurements will be used to evaluate the amount of drawdown the MPE system creates, as well as to evaluate groundwater flow direction. In addition, prior to collecting water levels in the new microwells and MPE wells, vacuum measurements will be collected from these wells with a magnehelic pressure gauge (MPE wells) and manometer (microwells), ensuring to maintain a tight air seal (two readings at each well, with 30 seconds between readings).

3.2.9 MPE System Evaluation

Vacuum measurements will be collected from the MPE wells and the new microwells to evaluate the area of influence of the vapor extraction system. While the system is operating, vacuum readings will be recorded from each of the pressure indicators for the MPE wells from inside the treatment building. The MPE system will then be turned off for three hours to allow the subsurface vapor pressures to equilibrate. To evaluate the recharge of the water table, water levels will be monitored in select wells (MPE-2, MPE-3, MPE-5, MPE-6, MPE-8, MPE-10, MPE-15, GS/GMW-4, and GS/GMW-2) on an hourly basis.

Prior to starting the blower for the SVE system, flow control valves to all wells will be closed off, and the dilution air flow control valve will be fully opened. To test select MPE wells, the flow control valve to the individual well to be tested will be opened, and then the dilution air valve will be closed slowly until the vacuum reading for the select well reaches the pre-system shut-down reading. Once the appropriate vacuum has been reached, vacuum at the select well head, as well as in the surrounding

MPE wells will be measured to evaluate the radius of influence of the MPE wells. Vacuum measurements will be collected by attaching a magnehelic pressure gauge (MPE well) or Manometer (microwell) to the top of the PVC well riser in such a manner that there is an airtight seal. To ensure a secure seal has been achieved, two measurements will be collected from each well, waiting 30 seconds between readings. MPE wells will be tested in the following manner:

1. Turn on MPE-10.
2. Measure vacuum in GMW-6, GMW-7, GMW-8, and GMW-9.
3. Turn off MPE-10.
4. Turn on MPE-4.
5. Measure vacuum in GMW-1, GMW-2, and GMW-3.
6. Turn MPE-6 (keep MPE-4 running).
7. Measure vacuum in GMW-3.
8. Turn off MPE-4.
9. Turn on MPE-10 (keeping MPE-6 running).
10. Measure vacuum in GMW-4, GMW-6, and GMW-7.

Prior to returning system to normal operation, collect last round of water level data from MPE and microwells.

3.2.10 Sewer Sampling

Previous investigations indicate that shallow groundwater at the Site is contaminated with chlorinated solvents. Data collected to date indicates that groundwater present in the shallow overburden flows towards the city sewer lines, which were constructed in the late 1800s. Based on the date of construction, it is possible that contaminated groundwater is leaching into the city sewer system. NYSDEC has requested MACTEC to conduct sewer sampling along Benton Street and South Clinton Avenue to investigate if contaminants from the groundwater are migrating into the city sewer system. Eight manholes shown on Figure 3.1 are proposed for sampling. Manholes were chosen based on their locations being up-stream, adjacent, and downstream of the Site.

Sampling will be conducted while the MPE system is shut down, to reduce extra water flow into the sewer lines. Water samples will be collected by opening the proposed manholes and sampling sewer water from the road surface. Under no circumstances will the manholes be entered to collect samples.

MACTEC will notify the dispatcher at Monroe County Pure Waters prior to commencing sampling. After implementing appropriate traffic controls (cones, signs and flashing vehicle light), each manhole will be opened, sampled, and closed prior to moving to the next manhole. Manholes will be opened using a pick axe and shovel. Upon opening the cover, oxygen and methane levels will be monitored with a lower explosive limit/oxygen meter, and VOCs will be monitored with a PID.

Water samples will be collected using a Geopump to pull water through ¼-inch low density polyethylene tubing that is attached (for stability) to ½-inch PVC pipe using zip-ties. A backup sampling system will be a weighted 1 ½-inch PVC water bailer. Where possible, dedicated sampling equipment will be used to minimize the chance of cross-contamination. At each manhole, MACTEC will collect one water sample for VOCs. Samples will be submitted to Columbia Analytical to be analyzed by method SW-846 8260B. Field observations will be noted in the log book, including observations of manhole depths and approximate water levels (using an electronic conductivity meter). Upon completion of sampling, the manhole cover rims will be cleaned of dirt prior to replacing to ensure they are properly seated.

3.3 DECONTAMINATION AND MANAGEMENT OF INVESTIGATION DERIVED WASTE

3.3.1 Decontamination

Sampling methods and equipment for this field program have been chosen to minimize decontamination requirements mitigating potential for cross contamination. Disposable sampling equipment will be used as much as practical to minimize decontamination time and water disposal. Non-disposable sampling equipment will be decontaminated before and after the collection of each sample. Decontamination methods and materials are described in detail in Subsection 4.3 of the QAPP.

Non disposable sampling equipment will be decontaminated by 1) washing the sample collection equipment with potable water and Liquinox, rinsing with potable water, rinsing with deionized water, and then allowing the equipment to air dry, or 2) steam cleaning the equipment and then allowing the equipment to air dry. Drilling equipment will be decontaminated by steam cleaning with potable water prior to each boring, and before leaving the Site. Drilling equipment (i.e. drill rods and casing) will be

decontaminated on a temporary decontamination pad constructed at the Site. Decontamination fluids will be released on-Site to the ground surface in the area of decontamination. In the event that decontamination fluids exhibit visual or olfactory evidence of contamination, or PID readings are above background, fluids will be temporarily containerized for disposal in the on-Site treatments system or for testing and off-Site disposal.

3.3.2 Investigation Derived Wastes

The method of disposing investigation derived wastes (IDW) generated during this RI will be based upon whether the wastes are considered hazardous or non-hazardous. The approach to field screening and handling of the IDW are described in the following paragraphs.

United States Department of Transportation (USDOT) -approved 55-gallon containers filled during the field investigation will be staged on-Site in an area designated by the NYSDEC, and approved by the Site owner. Transport and disposal of these containers will be arranged by MACTEC on behalf of NYSDEC. Containers will be labeled with the following information: drum contents; Site name and the NYSDEC Site Number; and date drum filling began and date drum was sealed.

Disposable Sampling Equipment. Used disposable equipment will be double bagged in polyethylene trash bags and sealed with twist ties. MACTEC personnel will measure the headspace in the closed bags with a PID at least one hour after sealing the bags. If the headspace reading is greater than 5 ppm, the tubing will be decontaminated by flushing with potable water and re-bagged. This process will be repeated until PID readings are below 5 ppm, or for a maximum of three times. If the headspace is below 5 ppm, the disposable equipment will be disposed of as non-hazardous municipal solid waste. If the headspace readings do not drop below 5 ppm, the disposable equipment will be placed in USDOT approved 55-gallon containers for off-Site disposal.

Personal Protective Equipment. Used protective clothing will be double bagged in polyethylene trash bags and sealed with twist ties. The bags will be disposed of as municipal solid waste.

Well Purge Water. Purge water will be released on-Site to the ground surface in the area of well. Purge water that exhibits visual or olfactory evidence of contamination, or PID readings above

background, will be containerized in USDOT approved 55-gallon containers for later disposal in the on-Site system or off-Site disposal.

Drill Cuttings. Direct push and drilling soil cuttings will be screened for VOCs with a PID. Soils with visual evidence of contamination, or with sustained PID readings greater than background will be containerized for off-Site disposal in USDOT-approved 55-gallon drums. Soils with sustained PID readings of less than or equal to background will be considered non-contaminated and will be used as backfill for the borings from which they were extracted. Remaining uncontaminated soils will be spread evenly on the ground surface in unpaved areas of the Site. If no on-Site space is available, remaining soil will be containerized in USDOT 55-gallon drums for off-Site disposal.

3.4 SITE SURVEY

A survey will be performed for the four newly installed monitoring wells and the 10 new microwells (no formal survey of the Site and surrounding area is scoped). Horizontal locations will be tied to the NYS Plane Coordinate System using North American Datum of 1983, and measured to an accuracy of 0.1 foot. Vertical elevations of groundwater monitoring wells will be tied to msl, using National Geodetic Vertical Datum of 1988, and measured to an accuracy of 0.01 foot. Locations of the six Geoprobe groundwater grab sample borings will be surveyed using a Trimble Global Positioning System.

3.5 REPORTING

Upon completion of the field investigations, the receipt of validated analytical data from the soil sampling, groundwater sampling, and soil vapor monitoring events, and the completion of all other data collection and evaluation, MACTEC will prepare a draft RI/FS.

The RI/FS Report will be submitted to the NYSDEC in portable document format and emailed to the NYSDEC project manager. At the completion of the WA, one paper copy of the RI/FS Report will be submitted along with three CDs containing a copy of the report. In addition, three paper copies will be submitted for the document repositories.

4.0 REFERENCES

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

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

MACTEC Engineering and Consulting, P.C. (MACTEC), 2009. Letter dated 8/1/2008 addressed to Lisa Lewis with the New York State Department of Environmental Conservation. Re: Dinaburg Distributing, Inc. – WA # D004434-17, Site #8-28-103. August 1, 2008.

MACTEC Engineering and Consulting, P.C. (MACTEC), 2009. Draft Remedial Investigation/Feasibility Study Report, Dinaburg Distributing, Inc. Prepared for the New York State Department of Environmental Conservation, Albany, New York. January 2009

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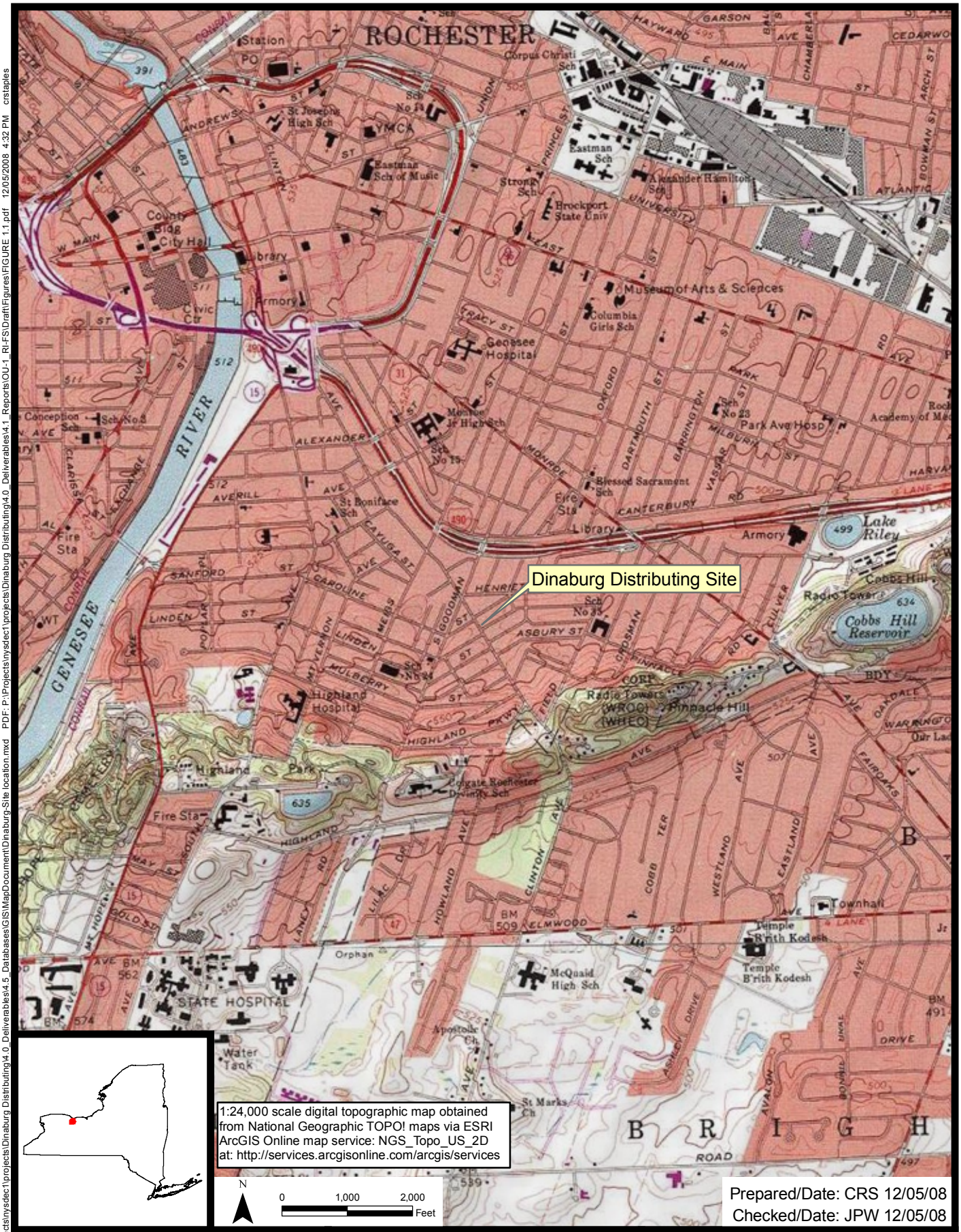
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URS Corporation, 2001. Final Remedial Investigation Report, Former Dinaburg Distributing, Inc., Site # 828103, Rochester, New York; prepared by URS Corporation. May 2001.

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FIGURES



NYSDEC
Dinaburg Distributing
Rochester, New York

MACTEC

Site Location
Project 3612082107
Figure 1.1

Document: P:\Projects\nysdec1\projects\Dinaburg Distributing\4.0_Deliverables\4.5_Databases\GIS\MapDocument\Dinaburg-Site location.mxd PDF: P:\Projects\nysdec1\projects\Dinaburg Distributing\4.0_Deliverables\4.1_Reports\OU-1_RI-FS\Draft\Figures\FIGURE 1.1.pdf 12/05/2008 4:32 PM crstaples



Legend

Proposed Explorations
- Sewer Line/Manhole Sample
- Geoprobe Soil Boring with Microwell
- Geoprobe Soil Boring
- Geoprobe Water Sample
- Monitoring Well
- Soil Vapor Sample

Existing Explorations
- Shallow Overburden Well
- Deep Overburden/Interface Well
- Bedrock Well

- Sewer Lines

Approximate Shallow Groundwater Isoconcentration Lines
- PCE = 10,000 µg/L
- PCE = 1,000 µg/L
- PCE = 100 µg/L
- PCE = 5 µg/L

0 15 30 Feet

Notes:
Aerial Photo from www.nysgis.state.ny.us.
Existing locations from URS, Inc.
PCE concentrations based on May 2008 URS data -concentration data from shallow overburden wells (in blue).

Prepared/Date: CRS 04/24/09
Checked/Date: JWP 04/24/09

NYSDEC
Dinaburg Distributing
Rochester, New York

MACTEC

Proposed Exploration Locations

Project 3612082107 Figure 3.1

TABLES

Table 2.1: Well Construction Data

Well ID	Well Type	Northing	Easting	Ground Elevation	Measuring Point (riser)	Total Depth	Bedrock Depth	Screen Length	Screened Zone
GPW-01	Monitoring Well	1145251.12	1412214.93	512.91	512.60	14.85	NA	NA	shallow overburden
GPW-02	Monitoring Well	1145177.67	1412238.38	512.79	512.61	14.05	NA	NA	shalllow overburden
MW-01	Monitoring Well	1145163.18	1412088.14	513.43	513.06	20.40	NA	5.0	interface?
MW-01A	Monitoring Well	1145167.68	1412095.54	513.52	513.05	8.00	NA	5.0	shallow overburden
MW-03C	Monitoring Well	1145186.36	1412204.99	513.14	512.72	32.70	22.70	5.0	bedrock
MW-03	Monitoring Well	1145182.30	1412208.19	513.34	513.10	21.20	NA	15.0	sh-overburden/interface
MW-04	Monitoring Well	1145082.53	1412145.89	513.30	513.01	24.10	23.10	15.0	sh-overburden/interface
MW-05	Monitoring Well	1145059.86	1412071.43	513.72	513.49	24.60	23.60	15.0	sh-overburden/interface
MW-06	Monitoring Well	1145321.34	1412126.45	512.06	511.54	20.60	19.90	15.0	sh-overburden/interface
MW-08K	Monitoring Well	1145200.50	1412282.75	512.57	512.24	19.20	17.80	10.0	interface
MW-08S	Monitoring Well	1145202.87	1412286.32	512.52	512.27	16.00	NA	10.0	shallow overburden
MW-09K	Monitoring Well	1145215.07	1412036.01	513.27	513.01	22.70	23.30	10.0	interface
MW-09S	Monitoring Well	1145222.49	1412032.24	513.27	512.87	16.00	NA	10.0	shallow overburden
MW-10K	Monitoring Well	1145249.96	1412155.07	512.84	512.49	21.80	22.00	10.0	interface
MW-10S	Monitoring Well	1145262.12	1412157.04	512.70	512.25	16.00	NA	10.0	interface
MW-11K	Monitoring Well	1145145.60	1412256.61	512.60	512.12	18.20	17.50	10.0	interface
MW-11S	Monitoring Well	1145151.97	1412267.48	512.60	512.36	14.00	NA	10.0	shallow overburden
GWE-1	Groundwater Extraction Well	1145169.29	1412098.94	NA	514.10	20.7	20.7	3.0	interface
GWE-2	Groundwater Extraction Well	1145152.18	1412176.25	NA	514.05	23	NA	3.0	interface
GWE-3	Groundwater Extraction Well	1145168.69	1412208.48	NA	514.20	22	22	3.0	interface
MPE-1	Multi-Phase-Extraction Well	1145189.12	1412144.04	NA	514.56	13.5	NA	10.0	shallow overburden
MPE-2	Multi-Phase-Extraction Well	1145171.11	1412146.99	NA	514.68	13.5	NA	7.5	shallow overburden
MPE-3	Multi-Phase-Extraction Well	1145181.10	1412159.95	NA	514.51	13.5	NA	10.0	shallow overburden
MPE-4	Multi-Phase-Extraction Well	1145200.34	1412161.44	NA	514.41	12.5	NA	9.5	shallow overburden
MPE-5	Multi-Phase-Extraction Well	1145190.07	1412178.90	NA	514.47	11.5	NA	8.5	shallow overburden
MPE-6	Multi-Phase-Extraction Well	1145211.03	1412177.89	NA	514.32	12	NA	9.0	shallow overburden
MPE-7	Multi-Phase-Extraction Well	1145220.69	1412160.51	NA	514.55	11	NA	8.0	shallow overburden
MPE-8	Multi-Phase-Extraction Well	1145231.19	1412178.09	NA	514.89	10	NA	7.0	shallow overburden
MPE-9	Multi-Phase-Extraction Well	1145229.75	1412207.61	NA	514.30	10	NA	7.0	shallow overburden
MPE-10	Multi-Phase-Extraction Well	1145199.14	1412195.70	NA	514.22	12	NA	9.0	shallow overburden
MPE-11	Multi-Phase-Extraction Well	1145211.42	1412213.24	NA	514.00	10	NA	4.0	shallow overburden
MPE-12	Multi-Phase-Extraction Well	1145216.50	1412230.91	NA	513.93	10	NA	4.0	shallow overburden
MPE-13	Multi-Phase-Extraction Well	1145189.45	1412201.57	NA	513.99	11.5	NA	5.0	shallow overburden
MPE-14	Multi-Phase-Extraction Well	1145180.61	1412231.49	NA	513.40	11	NA	5.0	shallow overburden
MPE-15	Multi-Phase-Extraction Well	1145171.25	1412212.97	NA	514.02	11	NA	5.0	shallow overburden
MPE-16	Multi-Phase-Extraction Well	1145159.62	1412199.41	NA	514.29	12	NA	9.0	shallow overburden
MPE-17	Multi-Phase-Extraction Well	1145160.23	1412170.58	NA	514.44	13.5	NA	7.5	shallow overburden
MPE-18	Multi-Phase-Extraction Well	1145181.48	1412197.43	NA	514.25	11	NA	8.0	shallow overburden

Notes:
Data from URS, Inc.
NA = not available

Table 3.1: Field Tasks and Methodology

LOCATION ID	DESCRIPTION AND METHODOLOGY	RATIONALE	ANALYTICAL
MW-12S, MW-12K, MW-13, MW-14	Install Overburden/bedrock interface monitoring wells at three locations around perimeter of the Site. One location will be paired with a shallow overburden well.	Evaluate groundwater contaminant concentrations around perimeter of the Site; specifically where grounwater data "gaps" may be present south, east, and west of the Site.	
MW-1, MW-1A, MW-2, MW-3, MW-3C, MW-4 to MW-6, MW-8K to MW-11K, MW-12S, MW-12K, MW-13, MW-14.	Collect a round of groundwater samples using low flow sampling techniques. Also collect a complete round of water level measurements (from all wells) and limited product level measurements.	Characterize current groundwater contaminant concentrations and evaluate natural attenuation activity.	VOCs by USEPA Method 8260B. Monitored Natural Attenuation Parameters. (See list and methods on Table 3.2).
GS-1 through GS-10	Complete ten Geoprobe soil borings between MPE wells at the Site. Log, screen, and sample soils to 16 feet bgs.	Evaluate/confirm the vertical distribution of contaminants in the overburden soils in the source area.	TLC VOCs using USEPA Method 8260B.
GMW-1 through GMW-10	Install microwells in the ten Geoprobe soil borings with screens set across the water table. Collect water level and vacuum measurements.	Evaluate the zone of influence of MPE wells on both groundwater drawdown and vapor extraction.	
All monitoring wells and MPE wells	Collect a complete round of water levels during operation of the SVE system. Turn off system and allow vapor conditions to equilibrate. Turn on vapor extraction in selected MPE wells and collect vacuum measurements in surrounding wells.	Evaluate the zone of influence of MPE wells on both groundwater drawdown and vapor extraction.	
GW-1 through GW-6	Complete six Geoprobe groundwater points around perimeter of site, collecting samples from approximately 10 feet and 20 feet bgs.	Evaluate/confirm the limits of the groundwater contamination in the overburden grounwater surrounding of the Site.	TLC VOCs using USEPA Method 8260B.
GS-11 through GS-14	Complete four Geoprobe soil borings north of the Site. Log, screen, and sample soils to 16 feet bgs.	Confirm that contaminants are not present in the overburden soils north of the Site.	TLC VOCs using USEPA Method 8260B.
SV-1 through SV-4	Complete three Geoprobe soil vapor points down gradient from site and collect soil vapor samples from just above the water table. Also collect one sub-slab soil vapor point from the commercial building adjacent to the Site.	Evaluate the potential exposure pathway via vapor intrusion.	TLC VOCs using air Method TO-15.
SL-1 through SL-8	Collect sewer samples from 8 sewers manholes located upgradient, cross-gradient, and downgradient of the Site.	Evaluate the potential discharge of contaminted groundwater to the sewer line.	TLC VOCs using USEPA Method 8260B.

Notes:
TCL VOCs = Target Compound List Volatile Organic Compounds

Prepared/Date: JKR 03/30/2009
Checked/Date: CRS 04/01/2009

Table 3.2: Summary of Sample Identification and Analysis

Exploration ID	Exploration Type	Media	Sample ID	MS/MSD	DUP	RINS	Trip	VOCs	MNA	Screened Zone
MW-01	Monitoring Well	Water	828103-MW01___09					1	1	interface
MW-01A	Monitoring Well	Water	828103-MW01A___09					1	1	Shallow overburden
MW-02	Monitoring Well	Water	828103-MW02___09					1	1	Shallow overburden
MW-03C	Monitoring Well	Water	828103-MW03C___09					1	1	bedrock
MW-03	Monitoring Well	Water	828103-MW03___09					1	1	overburden/interface
MW-04	Monitoring Well	Water	828103-MW04___09					1	1	overburden/interface
MW-05	Monitoring Well	Water	828103-MW05___09					1	1	overburden/interface
MW-06	Monitoring Well	Water	828103-MW06___09					1	1	overburden/interface
MW-08K	Monitoring Well	Water	828103-MW08K___09					1	1	interface
MW-08S	Monitoring Well	Water								Shallow overburden
MW-09K	Monitoring Well	Water	828103-MW09K___09					1	1	interface
MW-09S	Monitoring Well	Water								Shallow overburden
MW-10K	Monitoring Well	Water	828103-MW10K___09					1	1	overburden-interface
MW-10S	Monitoring Well	Water								Shallow overburden
MW-11K	Monitoring Well	Water	828103-MW11K___09					1	1	overburden-interface
MW-11S	Monitoring Well	Water								Shallow overburden
MW-12S	Monitoring Well	Water	828103-MW12S___09					1	1	Shallow overburden
MW-12S	Monitoring Well	Water /QC	828103-MW12S___09D		1			1	1	Shallow overburden
MW-12S	Monitoring Well	Water /QC	828103-MW12S___09MS	1				1		Shallow overburden
MW-12S	Monitoring Well	GW/QC	828103-MW12S___09MD	1				1		Shallow overburden
MW-12K	Monitoring Well	Water	828103-MW12K___09					1	1	interface
MW-13	Monitoring Well	Water	828103-MW13___09					1	1	interface
MW-14	Monitoring Well	Water	828103-MW14___09					1	1	interface
GMW-1	Microwell	DNA	DNA							
GMW-2	Microwell	DNA	DNA							
GMW-3	Microwell	DNA	DNA							
GMW-4	Microwell	DNA	DNA							
GMW-5	Microwell	DNA	DNA							
GMW-6	Microwell	DNA	DNA							
GMW-7	Microwell	DNA	DNA							
GMW-8	Microwell	DNA	DNA							
GMW-9	Microwell	DNA	DNA							
GMW-10	Microwell	DNA	DNA							
GS-1	Geoprobe Soil Boring	Soil	828103-GS1___09					1		
GS-2	Geoprobe Soil Boring	Soil	828103-GS2___09					1		
GS-3	Geoprobe Soil Boring	Soil	828103-GS3___09					1		
GS-4	Geoprobe Soil Boring	Soil	828103-GS4___09					1		
GS-5	Geoprobe Soil Boring	Soil	828103-GS5___09					1		
GS-5	Geoprobe Soil Boring	Soil/QC	828103-GS5___09D					1		
GS-5	Geoprobe Soil Boring	Soil/QC	828103-GS5___09MS					1		
GS-5	Geoprobe Soil Boring	Soil/QC	828103-GS5___09MD					1		
GS-6	Geoprobe Soil Boring	Soil	828103-GS6___09					1		
GS-7	Geoprobe Soil Boring	Soil	828103-GS7___09					1		
GS-8	Geoprobe Soil Boring	Soil	828103-GS8___09					1		
GS-9	Geoprobe Soil Boring	Soil	828103-GS9___09					1		
GS-10	Geoprobe Soil Boring	Soil	828103-GS10___09					1		
GS-11	Geoprobe Soil Boring	Soil	828103-GS11___09					1		
GS-12	Geoprobe Soil Boring	Soil	828103-GS12___09					1		
GS-13	Geoprobe Soil Boring	Soil	828103-GS13___09					1		
GS-14	Geoprobe Soil Boring	Soil	828103-GS14___09					1		

Table 3.2: Summary of Sample Identification and Analysis

Exploration ID	Exploration Type	Media	Sample ID	MS/MSD	DUP	RINS	Trip	VOCs	MNA	Screened Zone
GW-1	Geoprobe Water Boring	Water	828103-GW1_____09					1		
GW-2	Geoprobe Water Boring	Water	828103-GW2_____09					1		
GW-3	Geoprobe Water Boring	Water	828103-GW3_____09					1		
GW-4	Geoprobe Water Boring	Water	828103-GW4_____09					1		
GW-5	Geoprobe Water Boring	Water	828103-GW5_____09					1		
GW-6	Geoprobe Water Boring	Water	828103-GW6_____09					1		
SV-01	Soil Vapor Point	Vapor	828103-GV1_____09					1		
SV-02	Soil Vapor Point	Vapor	828103-GV2_____09					1		
SV-02	Soil Vapor Point	Vapor	828103-GV2_____09D					1		
SV-03	Soil Vapor Point	Vapor	828103-GV3_____09					1		
SV-04	Soil Vapor Point	Vapor	828103-GV4_____09					1		
SL-1	Sewer Sample	Water	828103-SL1_____09					1		
SL-2	Sewer Sample	Water	828103-SL2_____09					1		
SL-3	Sewer Sample	Water	828103-SL3_____09					1		
SL-4	Sewer Sample	Water	828103-SL4_____09					1		
SL-5	Sewer Sample	Water	828103-SL5_____09					1		
SL-6	Sewer Sample	Water	828103-SL6_____09					1		
SL-7	Sewer Sample	Water	828103-SL7_____09					1		
SL-8	Sewer Sample	Water	828103-SL8_____09					1		
QA/QC	Trip Blank	Water	828103-MWTB01				1			
QA/QC	Trip Blank	Water	828103-MWTB02				1			
QA/QC	Trip Blank	Water	828103-MWTB03				1			
QA/QC	Trip Blank	Soil	828103-GSTB01				1			
QA/QC	Trip Blank	Soil	828103-GSTB02				1			
QA/QC	Trip Blank	Soil	828103-GSTB03				1			
QA/QC	Equipment Blank	Soil	828103-GSQS01			1				
QA/QC	Equipment Blank	Water	828103-GSQS02 (if needed)			1				

Notes:

Data from URS, Inc.
NA = Not available
BOW = Bottom of well.
DNA = Does not apply
DD = Dinaburg Distributing, Inc.
GS = Geoprobe soil
DUP = Duplicate sample
RINS = Equipment rinseate blank sample
Trip = Trip blank sample
MW = Monitoring well sample
GW = Geoprobe water sample
MS/MSD = Matrix Spike/Matrix Spike Duplicate (not needed for MNA parameters)

VOC = Volatile organic compound analysis: Soil and water 8260B, Air TO-15.

MNA = Monitored natural attenuation parameters analysis

Monitoring Natural Attenuation Parameters = TOC by USEPA Method 415.1, Nitrate by NYSDEC ASP Method 352.1, Sulfate by NYSDEC ASP Method 375.4, Sulfide by NYSDEC ASP Method 376.2, Methane/Ethane/Ethene by ASTM Method D-1945, carbon dioxide by Hach Method, Nitrite by NYSDEC ASP Method 354.1,Alkalinity by USEPA Method 310.1, chloride by USEPA Method 325.3, and iron and manganese will be analyzed by USEPA Method 6010B. Dissolved oxygen, specific conductance and reduction/oxidation potential will be measured during well stabilization.

APPENDIX A

MACTEC SHORT FORM HASP

New York State Department of Health
Generic Community Air Monitoring Plan

A Community Air Monitoring Plan (CAMP) requires real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at the downwind perimeter of each designated work area when certain activities are in progress at contaminated sites. The CAMP is not intended for use in establishing action levels for worker respiratory protection. Rather, its intent is to provide a measure of protection for the downwind community (i.e., off-site receptors including residences and businesses and on-site workers not directly involved with the subject work activities) from potential airborne contaminant releases as a direct result of investigative and remedial work activities. The action levels specified herein require increased monitoring, corrective actions to abate emissions, and/or work shutdown. Additionally, the CAMP helps to confirm that work activities did not spread contamination off-site through the air.

The generic CAMP presented below will be sufficient to cover many, if not most, sites. Specific requirements should be reviewed for each situation in consultation with NYSDOH to ensure proper applicability. In some cases, a separate site-specific CAMP or supplement may be required. Depending upon the nature of contamination, chemical-specific monitoring with appropriately-sensitive methods may be required. Depending upon the proximity of potentially exposed individuals, more stringent monitoring or response levels than those presented below may be required. Special requirements will be necessary for work within 20 feet of potentially exposed individuals or structures and for indoor work with co-located residences or facilities. These requirements should be determined in consultation with NYSDOH.

Reliance on the CAMP should not preclude simple, common-sense measures to keep VOCs, dust, and odors at a minimum around the work areas.

Community Air Monitoring Plan

Depending upon the nature of known or potential contaminants at each site, real-time air monitoring for volatile organic compounds (VOCs) and/or particulate levels at the perimeter of the exclusion zone or work area will be necessary. Most sites will involve VOC and particulate monitoring; sites known to be contaminated with heavy metals alone may only require particulate monitoring. If radiological contamination is a concern, additional monitoring requirements may be necessary per consultation with appropriate NYSDEC/NYSDOH staff.

Continuous monitoring will be required for all ground intrusive activities and during the demolition of contaminated or potentially contaminated structures. Ground intrusive activities include, but are not limited to, soil/waste excavation and handling, test pitting or trenching, and the installation of soil borings or monitoring wells.

Periodic monitoring for VOCs will be required during non-intrusive activities such as the collection of soil and sediment samples or the collection of groundwater samples from existing monitoring wells. "Periodic" monitoring during sample collection might reasonably consist of taking a reading upon arrival at a sample location, monitoring while opening a well cap or overturning soil, monitoring during well bailing/purging, and taking a reading prior to leaving a sample location. In some instances, depending upon the proximity of potentially exposed individuals, continuous monitoring may be required during sampling activities. Examples of such situations include groundwater sampling at wells on the curb of a busy urban street, in the midst of a public park, or adjacent to a school or residence.

VOC Monitoring, Response Levels, and Actions

Volatile organic compounds (VOCs) must be monitored at the downwind perimeter of the immediate work area (i.e., the exclusion zone) on a **continuous** basis or as otherwise specified. Upwind concentrations should be measured at the start of each workday and periodically thereafter to establish background conditions. The monitoring work should be performed using equipment appropriate to measure the types of contaminants known or suspected to be present. The equipment should be calibrated at least daily for the contaminant(s) of concern or for an appropriate surrogate. The equipment should be capable of calculating 15-minute running average concentrations, which will be compared to the levels specified below.

- If the ambient air concentration of total organic vapors at the downwind perimeter of the work area or exclusion zone exceeds 5 parts per million (ppm) above background for the 15-minute average, work activities must be temporarily halted and monitoring continued. If the total organic vapor level readily decreases (per instantaneous readings) below 5 ppm over background, work activities can resume with continued monitoring.

- If total organic vapor levels at the downwind perimeter of the work area or exclusion zone persist at levels in excess of 5 ppm over background but less than 25 ppm, work activities must be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps, work activities can resume provided that the total organic vapor level 200 feet downwind of the exclusion zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less - but in no case less than 20 feet, is below 5 ppm over background for the 15-minute average.

- If the organic vapor level is above 25 ppm at the perimeter of the work area, activities must be shutdown.

All 15-minute readings must be recorded and be available for State (DEC and DOH) personnel to review. Instantaneous readings, if any, used for decision purposes should also be recorded.

Particulate Monitoring, Response Levels, and Actions

Particulate concentrations should be monitored **continuously** at the upwind and downwind perimeters of the exclusion zone at temporary particulate monitoring stations. The particulate monitoring should be performed using real-time monitoring equipment capable of measuring particulate matter less than 10 micrometers in size (PM-10) and capable of integrating over a period of 15 minutes (or less) for comparison to the airborne particulate action level. The equipment must be equipped with an audible alarm to indicate exceedance of the action level. In addition, fugitive dust migration should be visually assessed during all work activities.

- If the downwind PM-10 particulate level is 100 micrograms per cubic meter (mcg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression techniques must be employed. Work may continue with dust suppression techniques provided that downwind PM-10 particulate levels do not exceed 150 mcg/m^3 above the upwind level and provided that no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, downwind PM-10 particulate levels are greater than 150 mcg/m^3 above the upwind level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM-10 particulate concentration to within 150 mcg/m^3 of the upwind level and in preventing visible dust migration.

All readings must be recorded and be available for State (DEC and DOH) personnel to review.

June 20, 2000

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MACTEC, Inc.

MACTEC Short Form HASP

Site: Dinaburg Distributing, Inc. Job Number: 3612082107
Street Address: 1012 South Clinton Avenue, City of Rochester, Monroe County, New York
Proposed Date(s) of Investigation: May 4-20, 2009
Prepared by: Jerry Rawcliffe Date: 3/31/2009
*Approved by: KENDRA C. BAVOR Date: 4/3/09
Site Description: Former Dry cleaning supply company, the site is currently vacant and consists of a paved lot
(attach map) in a mixed commercial residential neighborhood.
Proposed Activity(s): Geoprobe soil and groundwater borings, HSA monitoring well installation, monitoring well development and sampling, soil vapor sampling
*Approval also serves as certification of a Hazard Assessment as required by 29 CFR 1910.132

Dates of Required Training and Medical Surveillance:

		Names of Field Team			
		Jerry Rawcliffe	Brandon Shaw	Chuck Staples	
	Req?	Dates	Dates	Dates	Dates
Medical Surveillance	yes	8/19/08			
Site Specific Medical Testing:_____	No				
40-Hour Initial	yes	5/17/85	5/13/05	12/15/97	
8-Hour Supervisor [1,3]	yes	9/29/89	4/13/06	8/1/04	
8-Hour Refresher	yes	5/28/08	5/28/08	5/28/08	
First Aid/CPR [1,2]	yes	9/9/08	2/26/08	3/13/07	
Respirator Fit Test [1]	NA				
Respirator Brand [1]	NA				
Hazard Communication [1]					
Fall Protection [1]	NA				
Confined Space Entry [1]	NA				

[1] If Applicable
[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 Sample Data	PEL/TLV	Fact Sheet Included
Trichloroethene	170,000 ug/L (GW) 22mg/kg (soil)	10 ppm/25 ppm-STEL	Yes
Tetrachloroethene	220,000 ug/L (GW) 310 mg/kg (soil)	25 ppm/100 ppm-STEL	Yes

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

Activity Specific JHAs:

☒	Mobilization/Demobilization and Site Preparation
☒	Field Work - General
☒	Decontamination
☒	Groundwater Sampling
☒	Soil Sampling
☐	
☐	

Hazard Specific JHAs:

☒	Geoprobe Soil Sampling
☒	Static Water Levels
☒	Working with Preservatives (Acids)
☒	Well Development
☐	
☐	
☐	

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

Chemicals	MSDS Attached?
LIQUINOX/ALCONOX	☒
HYDROCHLORIC ACID	☒
	☐
	☐

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

HAZARD IDENTIFICATION SUMMARY

Complete the checklist for summarizing the hazards identified in the JHAs

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

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

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

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

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

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

Ergonomic Hazards					
☒ Lifting	☒ Bending	☒ Twisting	☒ Pulling/tugging	☒ 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 Tyvek®	☐ Poly-coated Tyvek®	☐ Saranex®
☐ 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_nitrile_____		

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.

Air Monitoring Action Levels:

PID/FID Reading [1]	Detector Tube [1]	Dust Meter [1]	LEL[2]/O_2 [1]	Action	Level of PPE
Bgd-9 ppm				Continue to monitor breathing zone	D
9 ppm to 57 ppm				Continue to monitor breathing zone- if sustained readings above 9 ppm for 15 minutes, upgrade to level C.	D or C
➢ 57 ppm				If sustained readings greater than 57 ppm, stop work and reassess	Stop Work
			>10% LEL	Stop work. Evacuate area. If action levels continue to be exceeded, contact HSO, 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.)

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.

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 being located upwind of the work area. Work zones will be maintained through the use of:

☒ Warning Tape
☒ 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 Wash and Rinse	Scrub outer boots, outer gloves, and splash suit with decon 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: Strong Memorial Hospital	585-275-2121		
Police Department:	911		
Site Health And Safety Officer:	Office:	Home:	
Client Contact:	Office: ☒	Pager:	
Project Manager:Chuck Staples	Office:207-8283571	Home:	
Division EH&S Manager: Cindy Sundquist	Office: 207-828-3309 (w) 207-650-7593(c)	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
☐ Fire Extinguisher (ABC type)
☐ Eyewash (Note: 15 minutes of free-flowing fresh water)
☐ Other: _____

EMERGENCY PROCEDURES

- The HSO (or alternate) should be immediately notified via the on-site communication system. The HSO assumes control of the emergency response.
- The HSO notifies the Project Manager and client contact of the emergency. The HSO shall then contact the Division ES&H Manager who will then contact the Corporate EH&S Manager.
- If applicable, the HSO shall notify off-site emergency responders (e.g. fire department, hospital, police department, etc.) and shall inform the response team as to the nature and location of the emergency on-site.
- If applicable, the HSO evacuates the site. Site workers should move to the predetermined evacuation point (See Site Map).
- For small fires, flames should be extinguished using the fire extinguisher. Large fires should be handled by the local fire department.
- In an unknown situation or if responding to toxic gas emergencies, appropriate PPE, including SCBAs (if available), should be donned. If appropriate PPE is unavailable, site workers should evacuate and call in emergency personnel.
- 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 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.
- After the response, the SHSO shall follow-up with the required company reporting procedures, including the completing the MACTEC Incident Analysis Report.

Site Specific Procedures are as follows:

Drill subcontractor to clear utilities.

Follow NYSDEC Community Air Monitoring Plan

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

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Routes to Emergency Medical Facilities

PRIMARY HOSPITAL:

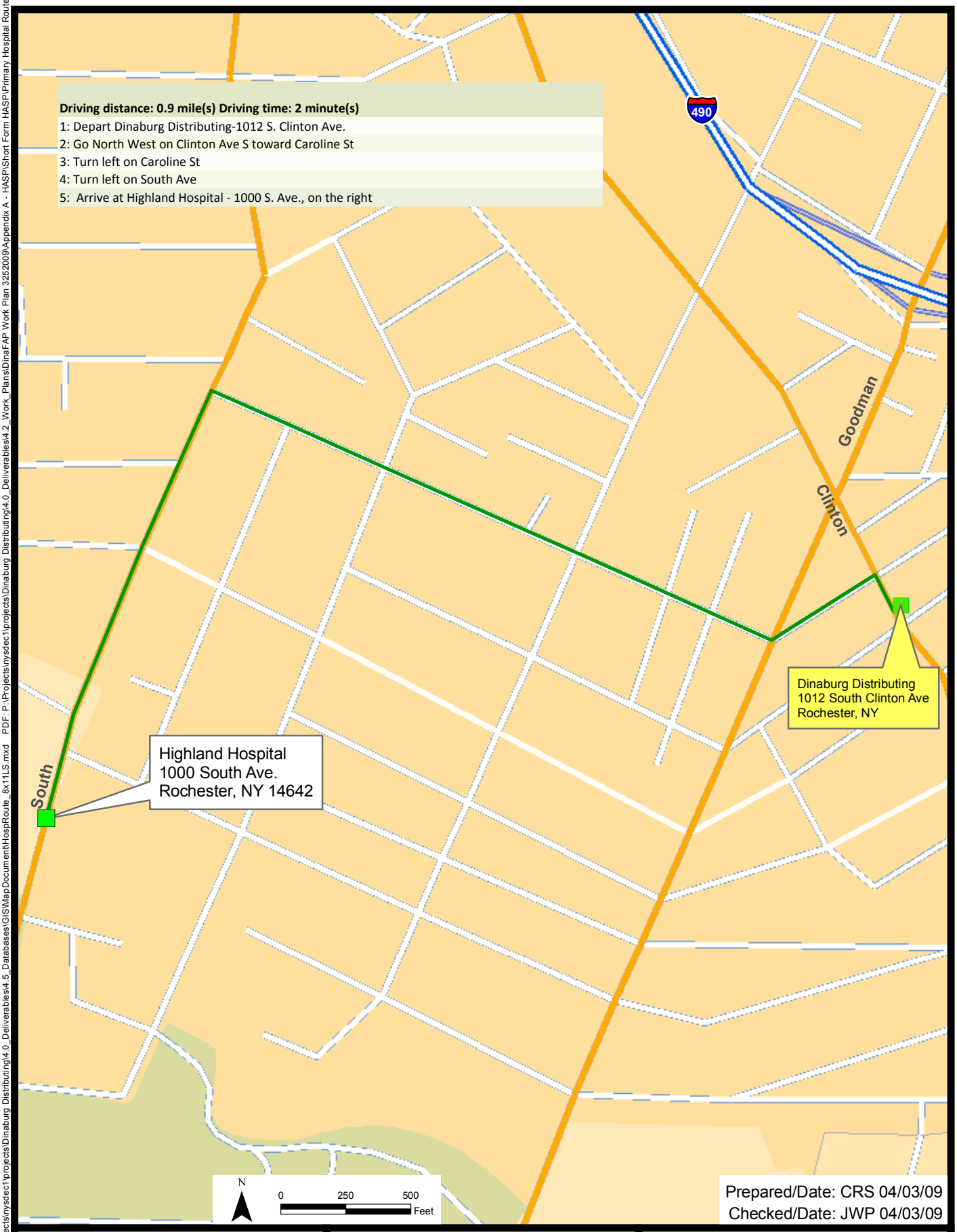
Facility Name: Highland Hospital of Rochester
Address: 1000 South Avenue, Rochester, NY
Telephone Number 585-473-2200

DIRECTIONS TO PRIMARY HOSPITAL (attach map):

ALTERNATE HOSPITAL:

Facility Name: Strong Memorial Hospital
Address: 575 Elmwood Avenue, Rochester, NY
Telephone Number 585-275-2121

DIRECTIONS TO ALTERNATE HOSPITAL (attach map):

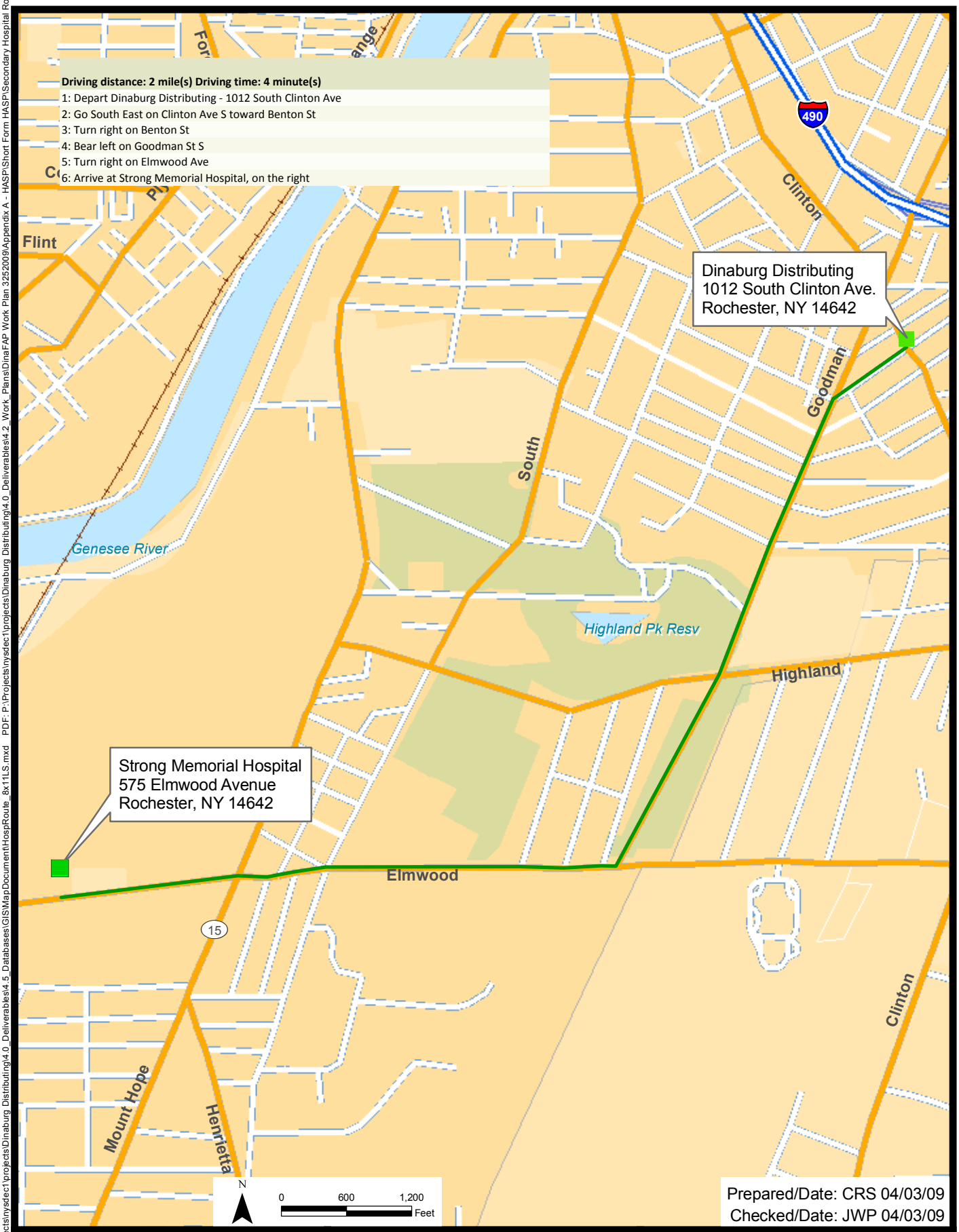


NYSDEC
Dinaburg Distributing
Rochester, NY

MACTEC

Primary Hospital Route
Highland Hospital

Document: P:\Projects\nysdec1\projects\Dinaburg Distributing\4.0_Deliverables\4.5_Databases\GIS\MapDocument\HospRoute_8x11LS.mxd PDF: P:\Projects\nysdec1\projects\Dinaburg Distributing\4.0_Deliverables\4.2_Work_Plans\DinaFAP Work Plan 3252009\Appendix A - HASP\Short Form HASP\Primary Hospital Route.pdf 04/03/2



Prepared/Date: CRS 04/03/09
Checked/Date: JWP 04/03/09

NYSDEC
Dinaburg Distributing
Rochester, NY

MACTEC

Secondary Hospital Route
Strong Memorial Hospital

Document: P:\Projects\nysdec1\projects\Dinaburg Distributing\4.0_Deliverables\4.5_Databases\GIS\MapDocument\HospRoute_8x11LS.mxd PDF: P:\Projects\nysdec1\projects\Dinaburg Distributing\4.0_Deliverables\4.2_Work_Plans\DinaFAP Work Plan 32520091Appendix A - HASP\Short Form HASP\Secondary Hospital Route.pdf 04/0

Check one
Initial Report: ☐
Update: ☐
Final Report: ☐

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
2. Administrative / Management Systems
3. Procedures
4. Human Factors Engineering
5. Training
6. Immediate Supervision
7. Communications
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:

Check one
Initial Report: ☐
Update: ☐
Final Report: ☐

ATTACHMENT 2

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)

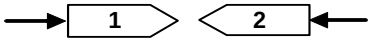
Form completed by: _____ Signature: _____ Date: _____

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

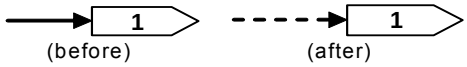
1. Most important: **STOP**.
2. **Call 911 if there are injuries.**
3. Call for an officer if the incident occurred on public property (streets, highways or roads). Disputes often arise between the parties involved as to who was at fault; therefore, a police report is important. If an officer is unable 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:

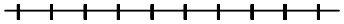
   http://intranet.mactec.com/EnvSafetyHealth/HealthSafety_Claims_Reporting.htm
9. Your supervisor will forward both completed incident reports immediately to your Division's ES&H Manager.

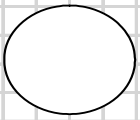
Instructions:

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: 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, headache 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/Model 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)

2003 by MACTEC Engineering & Consulting, Inc.

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: 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/Model 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 potash

2003 by MACTEC Engineering & Consulting, Inc.

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.

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.

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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.

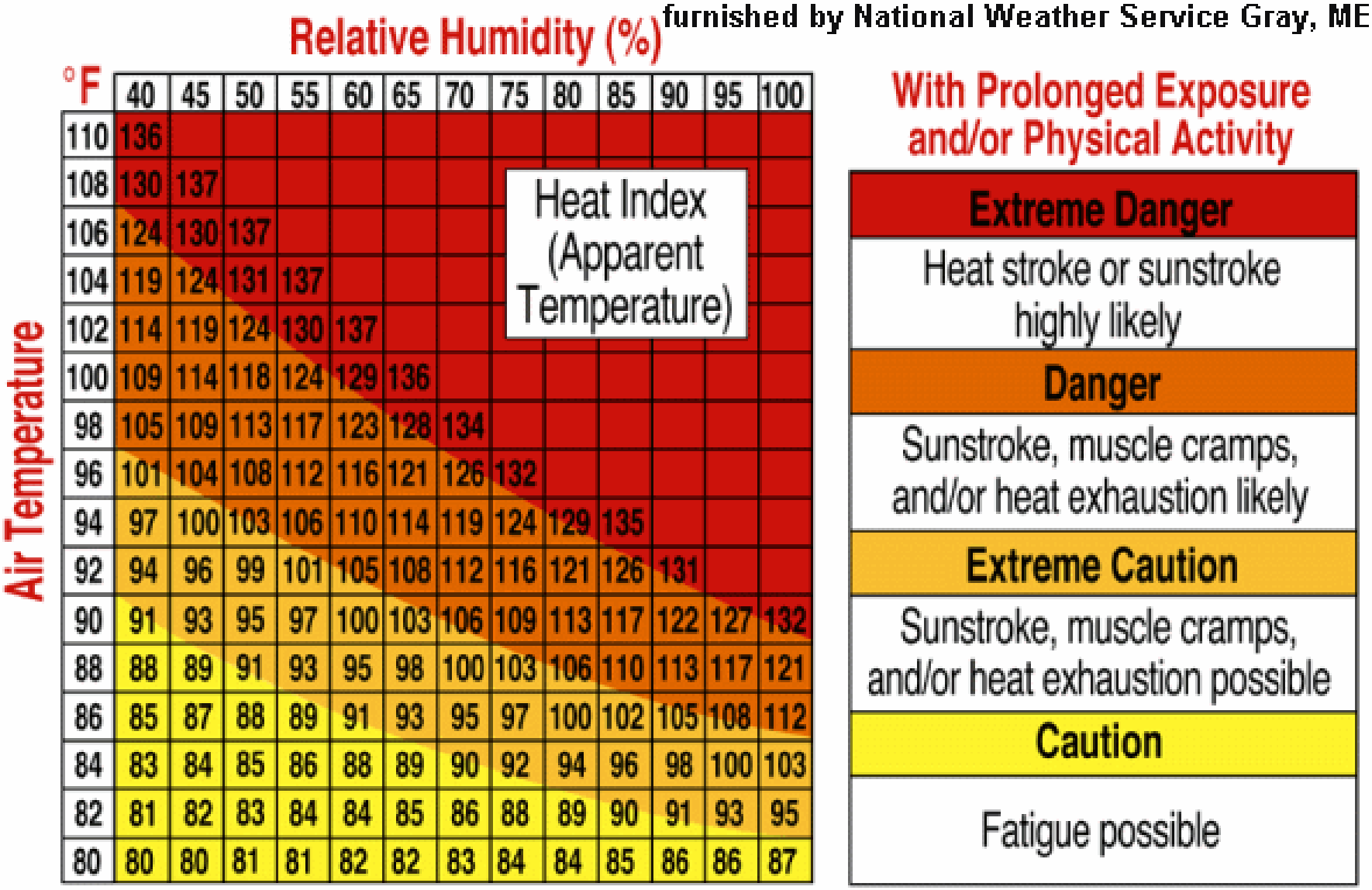
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Job Hazard Analysis – HASP Format

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

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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	4C) Exposure to contaminants	4C) 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.

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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	3A) 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	4A) Exposure to calibration gases	4A) Exposure to calibration gases ▪ Review equipment manuals ▪ Calibrate in a clean, well ventilated area
4. Opening the well cap, taking water level readings	5A) Contact with poisonous plants or the oil from poisonous plants	5A) 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.
	5B) Contact with biting insects (i.e., spiders, bees, etc.) which may have constructed a nest in the well cap/well.	5B) 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.
	5C) Exposure to hazardous Inhalation and contact with hazardous substances (VOC contaminated groundwater/ soil); liquid splash; flammable atmospheres.	5C) 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.
	5D) Back strain due to lifting bailers or pumps and from moving equipment to well locations	5D) Back strain ▪ Use mechanical aids when possible, if mechanical aids are not available, use two person lifts for heavy items. ▪ Use proper lifting techniques

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Job Hazard Analysis - HASP Format

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

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	5E) Foot injuries from dropped equipment	5E) 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	6A) Fire/Explosion/Contamination hazard from refueling generators	6A) 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
	6B) Electrocution	6B) 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.
	6C) Exposure to contaminants	6C) 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
	6D) Infectious water born diseases	6D) 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
	6E) Exposure to water preservatives	6E) 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 Acids - Sampling
	6F) Slips/trips/falls	6F) 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
	6G) Repetitive Motion and other Ergonomic Issues	6G) 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	7A) Contaminated water	7A) 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	8A) Freeze burns, back strain, hazardous chemical exposure, sample leakage	8A) 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: Soil Sampling **Date of Analysis:** 4/25/06

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 sampling event	1A) Chemical exposure	1A) Chemical Exposure ▪ Read HASP and determine air monitoring and PPE needs.
2. Carrying equipment to site location	2A) Back or muscle strain	2A) Back or muscle strain ▪ Use proper lifting techniques when lifting pumps or generators ▪ Use mechanical aids if available ▪ Use 2 person lift for heavy items
3. Calibrate monitoring equipment	1A) Exposure to calibration gases	3A) Exposure to calibration gases ▪ Review equipment manuals ▪ Calibrate in a clean, well ventilated area
4. Preparing sampling location	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. ▪ Wear PPE as described in the HASP. ▪ Do not touch anything part of your body/clothing. ▪ Always wash gloves before removing them. ▪ Discard PPE in accordance with the HASP.
	4B) Contact with biting insects (i.e., spiders, bees, etc.)	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 soil); 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 ▪ Monitor breathing zone air in accordance with HASP to determine levels of contaminants present. ▪ When decontaminating equipment wear additional eye/face protection over the safety glasses such as a face shield.
	4D) Back strain due to lifting or moving equipment to sampling locations	4D) Back strain ▪ Use mechanical aids when possible, if mechanical aids are not available, use two person lifts for heavy items. ▪ Use proper lifting techniques
	4E) Foot injuries from dropped equipment	4E) Foot Injuries ▪ Be aware when moving objects, ensure you have a good grip when lifting and carrying objects. ▪ Do not carry more than you can handle safely ▪ Wear steel toed boots

MACTEC

Job Hazard Analysis - HASP Format

Job Title: Soil Sampling **Date of Analysis:** 4/25/06

Key Work Steps	Hazards/Potential Hazards	Safe Practices
5. Collecting soil samples	5A) Working around drill rigs	5A) See JHA - Drilling
	5B) Encountering underground or overhead utilities	5B) Have all utilities located.
	5C) Fire/Explosion/Contamination hazard from refueling generators	5C) 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
	5D) Electrocution	5D) 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.
	5E) Exposure to contaminants	5E) 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
	5F) Exposure to preservatives	5F) Exposure to preservatives ▪ Work in a well ventilated area, upwind of samples ▪ Wear chemical resistant PPE as identified in HASP ▪ Review MSDSs
	5G) Slips/trips/falls	5G) Slips/trips/falls ▪ Ground can become wet/muddy ▪ Wear good slip resistant footwear
	5H) Lifting Injury	5H) Lifting injury ▪ Use proper lifting techniques when carrying quantities of samples ▪ Use proper ergonomics when hand digging for samples
	5I) Eye injury	5I) Eye Injury ▪ Wear eye protection when using picks or similar devices to loosen soil

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Job Hazard Analysis - HASP Format

Job Title: Soil Sampling **Date of Analysis:** 4/25/06

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	5J) Fire	5J) Fire ▪ When using gas powered auger, maintain fire watch whenever fueling or otherwise handling gasoline ▪ See JHA - Gasoline
6. Soil sampling using floor corer	6A) Back injury	6A) Back Injury ▪ Use proper lifting techniques when moving floor corer and generator ▪ Use mechanincal aids if available ▪ Use two person lift for heavy items.
	6B) Electric Shock	6B) Electric Shock ▪ Use electric cords free from defects ▪ Keep cords out of water ▪ Ensure all electrical equipment is properly grounded ▪ Use GFCI
	6C) Hearing	6C) Hearing ▪ Wear hearing protection
	6D) Fire	6D) Fire ▪ When using generator, maintain fire watch whenever refueling or otherwise handling gasoline ▪ See JHA - Gasoline
	6E) Contamination	6E) Contamination ▪ Use appropriate PPE for the contaminants of concern (see HASP). ▪ Minimize sample contact ▪ Label sample in accordance with procedures ▪ Monitor breathing zone levels.

MACTEC

Job Hazard Analysis - HASP Format

Job Title: Environmental Drilling/Boring and Associated Soil Sampling **Date of Analysis:** 7/26/06

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

*See HASP for all required PPE

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

MACTEC

Job Hazard Analysis - HASP Format

Job Title: Environmental Drilling/Boring and Associated Soil Sampling **Date of Analysis:** 7/26/06

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

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Job Hazard Analysis - HASP Format

Job Title: Environmental Drilling/Boring and Associated Soil Sampling **Date of Analysis:** 7/26/06

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

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Job Hazard Analysis - HASP Format

Job Title: Environmental Drilling/Boring and Associated Soil Sampling **Date of Analysis:** 7/26/06

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

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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.

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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

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Job Hazard Analysis - HASP Format

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

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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.

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Job Hazard Analysis - HASP Format

Job Title: Well Development **Date of Analysis:** 8/11/06

Minimum Recommended PPE*:

*See HASP for all required PPE

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

MACTEC

Job Hazard Analysis - HASP Format

Job Title: Well Development **Date of Analysis:** 8/11/06

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

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Job Hazard Analysis - HASP Format

Job Title: Well Development **Date of Analysis:** 8/11/06

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

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.

Material Safety Data Sheet
Hydrochloric Acid, Reagent ACS

ACC# 95547

Section 1 - Chemical Product and Company Identification

MSDS Name: Hydrochloric Acid, Reagent ACS
Catalog Numbers: AC423790025, AC423790250, AC423795000, NC9619320
Synonyms: Muriatic acid; Chlorohydric acid; Hydrogen chloride; Spirits of salt
Company Identification:

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
7647-01-0	Hydrochloric acid	36.5	231-595-7
7732-18-5	Water	Balance	231-791-2

Hazard Symbols: C
Risk Phrases: 34 37

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: colorless to slight yellow clear liquid. **Danger!** Corrosive. Causes eye and skin burns. May cause severe respiratory tract irritation with possible burns. May cause severe digestive tract irritation with possible burns. May be harmful if swallowed.
Target Organs: Respiratory system, teeth, eyes, skin, circulatory system.

Potential Health Effects

Eye: May cause irreversible eye injury. Vapor or mist may cause irritation and severe burns. Contact with liquid is corrosive to the eyes and causes severe burns. May cause painful sensitization to light.
Skin: May be absorbed through the skin in harmful amounts. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. Contact with liquid is corrosive and causes severe burns and ulceration.
Ingestion: May cause circulatory system failure. Causes severe digestive tract burns with abdominal pain, vomiting, and possible death. May cause corrosion and permanent tissue destruction of the esophagus and digestive tract. May be harmful if swallowed.
Inhalation: May cause severe irritation of the respiratory tract with sore throat, coughing,

shortness of breath and delayed lung edema. Causes chemical burns to the respiratory tract. Exposure to the mist and vapor may erode exposed teeth. Causes corrosive action on the mucous membranes.
Chronic: Prolonged or repeated skin contact may cause dermatitis. Repeated exposure may cause erosion of teeth. May cause fetal effects. Laboratory experiments have resulted in mutagenic effects. Prolonged exposure may cause conjunctivitis, photosensitization, and possible blindness.

Section 4 - First Aid Measures

Eyes: Get medical aid immediately. Do NOT allow victim to rub or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes). SPEEDY ACTION IS CRITICAL!
Skin: Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.
Ingestion: Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately. Give milk of magnesia.
Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.
Notes to Physician: Do NOT use sodium bicarbonate in an attempt to neutralize the acid.
Antidote: Do NOT use oils or ointments in eye.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Not flammable, but reacts with most metals to form flammable hydrogen gas. Use water spray to keep fire-exposed containers cool. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Reaction with water may generate much heat which will increase the concentration of fumes in the air. Containers may explode when heated.
Extinguishing Media: For large fires, use water spray, fog, or alcohol-resistant foam. Substance is nonflammable; use agent most appropriate to extinguish surrounding fire. Do NOT get water inside containers. Do NOT use straight streams of water. Most foams will react with the material and release corrosive/toxic gases. Cool containers with flooding quantities of water until well after fire is out. For small fires, use carbon dioxide (except for cyanides), dry chemical, dry sand, and alcohol-resistant foam.
Flash Point: Not applicable.
Autoignition Temperature: Not applicable.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 3; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Large spills may be neutralized with dilute alkaline solutions of soda ash (sodium carbonate, Na2CO3), or lime (calcium oxide, CaO). Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Remove all sources of ignition. Provide ventilation. Do not get water inside containers. A vapor suppressing foam may be used to reduce vapors. Cover with dry earth, dry sand, or other non-combustible material followed with plastic sheet to minimize spreading and contact with water.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well-ventilated area. Contents may develop pressure upon prolonged storage. Do not breathe dust, vapor, mist, or gas. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Do not ingest or inhale. Discard contaminated shoes. Use caution when opening. Keep from contact with moist air and steam.
Storage: Do not store in direct sunlight. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Corrosives area. Do not store in metal containers. Store protected from moisture. Do not store near flammable or oxidizing substances (especially nitric acid or chlorates).

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use adequate general or local exhaust ventilation to keep airborne concentrations below the permissible exposure limits.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Hydrochloric acid	2 ppm Ceiling	50 ppm IDLH	5 ppm Ceiling; 7 mg/m3 Ceiling
Water	none listed	none listed	none listed

OSHA Vacated PELs: Hydrochloric acid: No OSHA Vacated PELs are listed for this chemical.
Water: No OSHA Vacated PELs are listed for this chemical.
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear neoprene or polyvinyl chloride gloves to prevent exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant a respirator's use.

Section 9 - Physical and Chemical Properties

Physical State: Clear liquid
Appearance: colorless to slight yellow

Odor: strong, pungent
pH: 0.01
Vapor Pressure: 5.7 mm Hg @ 0 deg C
Vapor Density: 1.26
Evaporation Rate:> 1.00 (N-butyl acetate)
Viscosity: Not available.
Boiling Point: 81.5-110 deg C @ 760 mmHg
Freezing/Melting Point:-74 deg C
Decomposition Temperature: Not available.
Solubility: Miscible.
Specific Gravity/Density:1.0-1.2
Molecular Formula:HCl.H2O
Molecular Weight:36.46

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: Mechanical shock, incompatible materials, metals, excess heat, exposure to moist air or water, bases.
Incompatibilities with Other Materials: Acetates, acetic anhydride, alcohols + hydrogen cyanide, 2-aminoethanol, ammonium hydroxide, calcium carbide, calcium phosphide, cesium acetylene carbide, cesium carbide, chlorosulfonic acid, 1,1-difluoroethylene, ethylene diamine, ethyleneimine, fluorine, lithium silicides, magnesium boride, mercuric sulfate, oleum, perchloric acid, potassium permanganate, beta-propiolactone, propylene oxide, rubidium acetylene carbide, rubidium carbide, silver perchlorate + carbon tetrachloride, sodium, sodium hydroxide, sulfuric acid, uranium phosphide, vinyl acetate, zinc, metal oxides, aluminum, amines, carbonates, iron, steel, copper alloys, copper, alkali metals, bases, moisture.
Hazardous Decomposition Products: Hydrogen chloride, chlorine, carbon monoxide, carbon dioxide, hydrogen gas.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 7647-01-0: MW4025000; MW4031000
CAS# 7732-18-5: ZC0110000
LD50/LC50:
CAS# 7647-01-0:
Inhalation, mouse: LC50 = 1108 ppm/1H;
Inhalation, mouse: LC50 = 8300 mg/m3/30M;
Inhalation, rat: LC50 = 3124 ppm/1H;
Inhalation, rat: LC50 = 45000 mg/m3/5M;
Inhalation, rat: LC50 = 8300 mg/m3/30M;
Oral, rabbit: LD50 = 900 mg/kg;
CAS# 7732-18-5:
Oral, rat: LD50 = >90 mL/kg;
Carcinogenicity:
CAS# 7647-01-0:
ACGIH: A4 - Not Classifiable as a Human Carcinogen
IARC: IARC Group 3 - not classifiable CAS# 7732-18-5: Not listed by ACGIH, IARC, NIOSH, NTP,

or OSHA.
Epidemiology: Experimental reproductive effects have been reported.
Teratogenicity: Embryo or Fetus: Stunted fetus, Inhalation, rat TCL0=450 mg/m3/1H Specific Developmental Abnormalities: homeostatis, Inhalation, rat TCL0=450 mg/m3/1H (female 1 days pre-mating).
Reproductive Effects: No information available.
Neurotoxicity: No information available.
Mutagenicity: Cytogenetic analysis: Hamster, lung = 30 mmol/L.; Cytogenetic analysis: Hamster, ovary = 8 mmol/L.
Other Studies: No data available.

Section 12 - Ecological Information

Ecotoxicity: Fish: Bluegill/Sunfish: 3.6 mg/L; 48Hr; Lethal (unspecified) Bluegill/Sunfish: LC50; 96 Hr; pH 3.0-3.5 No data available.
Environmental: Rapidly hydrolyzes when exposed to water. Will exhibit extensive evaporation from soil surfaces. Upon transport through the soil, hydrochloric acid will dissolve some of the soil materials (especially those with carbonate bases) and the acid will neutralize to some degree.
Physical: No information available.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

Section 14 - Transport Information

	US DOT	IATA	RID/ADR	IMO	Canada TDG
Shipping Name:	HYDROCHLORIC ACID				No information available.
Hazard Class:	8				
UN Number:	UN1789				
Packing Group:	II				

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7647-01-0 is listed on the TSCA inventory.

CAS# 7732-18-5 is listed on the TSCA inventory.

Health & Safety Reporting List

None of the chemicals are on the Health & Safety Reporting List.

Chemical Test Rules

None of the chemicals in this product are under a Chemical Test Rule.

Section 12b

None of the chemicals are listed under TSCA Section 12b.

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

SARA

CERCLA Hazardous Substances and corresponding RQs

CAS# 7647-01-0: 5000 lb final RQ; 2270 kg final RQ

SARA Section 302 Extremely Hazardous Substances

CAS# 7647-01-0: 500 lb TPQ

SARA Codes

CAS # 7647-01-0: acute.

Section 313

This material contains Hydrochloric acid (CAS# 7647-01-0, 36 5%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

CAS# 7647-01-0 is listed as a hazardous air pollutant (HAP). This material does not contain any Class 1 Ozone depletors. This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

CAS# 7647-01-0 is listed as a Hazardous Substance under the CWA. None of the chemicals in this product are listed as Priority Pollutants under the CWA. None of the chemicals in this product are listed as Toxic Pollutants under the CWA.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 7647-01-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

C

Risk Phrases:

R 34 Causes burns.

R 37 Irritating to respiratory system.

Safety Phrases:

S 1/2 Keep locked up and out of reach of children.

S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.

S 36/37/39 Wear suitable protective clothing, gloves and eye/face protection.

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

S 9 Keep container in a well-ventilated place.

WGK (Water Danger/Protection)

CAS# 7647-01-0: 1
CAS# 7732-18-5: No information available.

Canada - DSL/NDSL

CAS# 7647-01-0 is listed on Canada's DSL List.
CAS# 7732-18-5 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D1A, E.

Canadian Ingredient Disclosure List

CAS# 7647-01-0 is listed on the Canadian Ingredient Disclosure List.

Exposure Limits

CAS# 7647-01-0: OEL-AUSTRALIA:TWA 5 ppm (7 mg/m3) OEL-AUSTRIA:TWA 5 ppm (7 mg/m3) OEL-BELGIUM:STEL 5 ppm (7.7 mg/m3) OEL-DENMARK:STEL 5 ppm (7 mg/m3) OEL-FINLAND:STEL 5 ppm (7 mg/m3);Skin OEL-FRANCE:STEL 5 ppm (7.5 mg/m3) OEL-GERMANY:TWA 5 ppm (7 mg/m3) OEL-HUNGARY:STEL 5 mg/m3 OEL-JAPAN:STEL 5 ppm (7.5 mg/m3) OEL-THE NETHERLANDS:TWA 5 p pm (7 mg/m3) OEL-THE PHILIPPINES:TWA 5 ppm (7 mg/m3) OEL-POLAND:TWA 5 mg/m3 OEL-RUSSIA:STEL 5 ppm (5 mg/m3) OEL-SWEDEN:STEL 5 ppm (8 mg/m3) OEL-SWITZERLAND:TWA 5 ppm (7.5 mg/m3);STEL 10 ppm (15 mg/m3) OEL -THAILAND:TWA 5 ppm (7 mg/m3) OEL-TURKEY:TWA 5 ppm (7 mg/m3) OEL-UNI TED KINGDOM:TWA 5 ppm (7 mg/m3);STEL 5 ppm (7 mg/m3) OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV OEL IN NEW ZEALAND, SINGAPOR E, VIETNAM check ACGI TLV

Section 16 - Additional Information

MSDS Creation Date: 7/06/1999
Revision #4 Date: 8/14/2003

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no event shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.