FINAL
REMEDIAL INVESTIGATION/FEASIBILITY STUDY WORK PLAN
BRAM MANUFACTURING

SITE # 3-44-055

WORK ASSIGNMENT NO. D004434-28

Prepared for:

New York State Department of Environmental Conservation

Albany, New York

Prepared by:

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

MACTEC: 3612082098

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GLOSSARY OF ACRONYMS AND ABBREVIATIONS

ASP	Analytical Services Protocols
Ballard	Ballard Engineering Consulting, P.C.
bgs	below ground surface
Bram	Bram Manufacturing
CPP	Community Participation Plan
CSM	Conceptual Site Model
DCE	dichloroethene
ESA	Environmental Site Assessment
°F	degrees Fahrenheit
FS	Feasibility Study
HASP	Health and Safety Plan
Hg	Mercury
HSA	Hollow Stem Auger
IDW	investigation-derived wastes
IRM	Interim Remedial Measure
MACTEC	MACTEC Engineering and Consulting, P.C.
MBE	minority business enterprise
msl	mean sea level
NELAP	National Environmental Laboratory Accreditation Program
NYCRR	New York Codes, Rules, and Regulations
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation

GLOSSARY OF ACRONYMS AND ABBREVIATIONS (CONTINUED)

NYSDOH	New York State Department of Health
PCB	polychlorinated biphenyls
PID	photoionization detector
PVC	Polyvinyl Chloride
QA	Quality Assurance
QAPjP	Quality Assurance Project Plan
QAPP	Quality Assurance Program Plan
QC	Quality Control
RCHD	Rockland County Health Department
RI	Remedial Investigation
SCGs	standards, criteria and guidance values
Site	Bram Manufacturing Site
SVOC	semivolatile organic compound
TAL	Target Analyte List
TCA	trichloroethane
TEAM	TEAM Environmental Consultants, Inc.
µg/L	microgram per Liter
$\mu g/m^3$	microgram per cubic meter
USEPA	United States Environmental Protection Agency
UST	underground storage tank
VOC	Volatile Organic Compound
WA	Work Assignment
WP	Remedial Investigation/Feasibility Study Work Plan

1.0 INTRODUCTION

This Remedial Investigation/Feasibility Study (RI/FS) Work Plan (WP) has been prepared by MACTEC Engineering and Consulting, P.C. (MACTEC) in response to Work Assignment (WA) No. D004434-28 from the New York State Department of Environmental Conservation (NYSDEC) for the Bram Manufacturing (Bram) site (Site) in Town of Congers, Rockland County, New York (Figure 1.1). The Site is listed as a Class 2 Inactive hazardous waste site; Site No. 3-44-055, in the Registry of Hazardous Waste Sites in New York State (NYS). This WP has been prepared in accordance with the NYSDEC requirements in WA No. D004434-28, dated January 19, 2008, and with the July 2005 Superfund Standby Contract between MACTEC and the NYSDEC.

The RI for the Site is being conducted in accordance with the WA, as well as with the United States Environmental Protection Agency (USEPA) Remedial Investigation/Feasibility Study guidance (USEPA, 1988); NYSDEC Technical and Administrative Guidance Memorandum #4025 entitled "Guidelines for Remedial Investigations/Feasibility Studies" (NYSDEC, 1989); and the NYSDEC Draft DER-10 "Technical Guidance for Site Investigation and Remediation" (NYSDEC, 2002). This WP presents a technical scope of work for completing the RI/FS activities and preparing the RI reports.

The objectives of the RI are to determine the nature and distribution of contamination associated with the Site. The investigation will assess the potential threats to human health and the environment from the Site by delineating the extent of potential groundwater and soil vapor contamination. The FS will develop remedial objectives and evaluate potential remedial alternatives from an engineering, environmental, public health, and economic perspective and develop a preferred alternative.

This WP is organized into six sections as follows:

- *Section 1.0* – Introduction.
- *Section 2.0* – Site Background and Physical Setting: Consists of a review of existing Site information and presents the current conceptual site model (CSM).
- *Section 3.0* – Scope of Work: Details work to be performed to complete the WA, including: WP and Budget Preparation; RI activities and reporting; the various human and ecological Risk Assessment tasks; and the FS.
- *Section 4.0* – Project Organization.

- *Section 5.0* – Project Budget, Schedule, and Assumptions.
- *Section 6.0* – Workplan References.

The WP is supplemented by the following attached documents:

- *Appendix A* – The Site specific Quality Assurance Project Plan (QAPjP);
- *Appendix B* – The Site specific Health and Safety Plan (HASP);
- *Appendix C* – Community Participation Plan (CPP); and
- *Appendix D* – Cost Tables (under separate cover)

2.0 SITE BACKGROUND AND PHYSICAL SETTING

On February 7, 2008, MACTEC personnel visited the Site and adjacent areas south of the Site with representatives of the NYSDEC. Information pertaining to the history of Site operations and past releases of contamination were reviewed to help prepare the WP for the RI field investigation. The observations of the Site reconnaissance, information collected, as well as information provided in the WA, is summarized below.

2.1 SITE LOCATION AND DESCRIPTION

The Site is located at 26 Route 9W in the Town of Congers, Rockland County (Figure 1.1). It is identified on the town of Clarkstown tax map as Section 141, Block A, Lot 8. The Site is located on Route 9W and is within 200 feet of the Kill Von Beaste which connects Swartwout Lake with Rockland Lake, and consists of an open lot and contains a one story 12,300 square foot block construction building. The Site is currently used as both office space and storage. The previous occupant was a manufacturer of lighting fixtures. The property is bordered immediately to the north by a Motel (Holiday Court); to the east by a storage facility, a stream (Kill Von Beaste), and a wetland; to the south by a commercial, property and to the west by Route 9W. Residences are located further to the north and on the west dies of Route 9W. The prior uses that appear to have led to contamination include the manufacturing of lighting fixtures and possible disposal of waste products.

2.2 PREVIOUS FIELD INVESTIGATIONS

As provided in the NYSDEC Work Authorization letter to MACTEC (NYSDEC, 2008), and the Site Record (Site Code 344055) limited investigative activities have been conducted at the Site. In 1998, Team Environmental Consultants, Inc. (TEAM) conducted a Phase I Environmental Site Assessment (ESA) of the Bram property and two adjacent properties to the east and northeast (TEAM, 1998). Also in 1998, Ballard Engineering Consulting, P.C. (Ballard), performed a groundwater investigation at the Site (Ballard, 1999). In 1990, three underground storage tanks (USTs) were removed at the request of the Rockland County Health Department (RCHD) in the property south of the Site. The NYSDEC also collected groundwater samples in 2003 from an inactive water supply well for the Site.

ESA. As part of the ESA performed by TEAM, the inactive water supply well was sampled. Volatile organic compounds (VOCs) were detected in this sample including trichloroethene [7,500 micrograms per Liter (µg/L)], cis-1,2-dichloroethene (cis-1,2-DCE) [2,600 µg/L], 1,3-dichloropropane [510 µg/L], vinyl chloride [280 µg/L], and 1,1,1-trichloroethane (1,1,1-TCA) [87j µg/L]. The ESA notes that the water supply well was inactivated over twenty years ago (CIRCA 1070s). Other recognized environmental conditions were not observed at the time of this ESA publication.

Groundwater Investigation. The investigation by Ballard focused on collecting shallow groundwater from eight direct push borings (GW-B1 through GW-B8). Temporary sampling points were used to collect the groundwater samples. The inactive water supply well was also sampled. Figure 2.1 shows the location of these sampling points and the inactive water supply well (GW-PW). Analytical results indicate part per million concentrations of VOCs in GW-PW, GW-B1, GW-B2, and GW-B8. Compounds detected include the chlorinated solvents TCE, tetrachloroethane (TCA), and DCE, and vinyl chloride, and the aromatic hydrocarbons trimethylbenzene, ethylbenzene, butylbenzene, propylbenzene, isopropylbenzene and xylenes. Highest levels of the chlorinated solvents were in GW-PW and GW-B8 respectively and are likely related to the former Site activities. Highest concentrations of aromatic hydrocarbons are GW-B2 and GW-B1 respectively. These are presumed upgradient locations from the Site, downgradient of the former USTs, and are likely related to the former USTs.

UST Removal. In the property to the south of the Site, three USTs were removed in 1990 at the request of RCHD (NYSDEC Spill no. 89-1 1904). The UST removals were performed by Tank Tech. Reporting was provided by Subsurface Investigations Inc. (SII, 1990). The three USTs consisted of two 4,000 gallon diesel fuel tanks and one 2,500 gallon unleaded gasoline tank. The diesel tanks were reported as "intact" and the gasoline tank was reported corroded with holes. Approximately 15 tons of contaminated soil was removed from the gasoline tank excavation. An 18-inch slotted monitoring well (MW-1) was installed in the contaminated soil area to be used as a recovery well if needed. Two 2-inch polyvinyl chloride (PVC) monitoring wells (MW-2 and MW-2) were also installed. Figure 2.1 shows the approximate location of the monitoring wells and excavated areas. Groundwater analytical data detected benzene, toluene, ethylbenzene, and xylene concentrations of 26 µg/L, 10 µg/L, 8 µg/L, and 33 µg/L respectively. Groundwater data from MW-2 and MW-3 was non-detect. NYSDEC issued a "no further action at this time" decision.

NYSDEC sampling. In 2003, the NYSDEC sampled groundwater from the inactive water supply well (GW-PW) to determine if contaminant concentrations were remaining constant. Samples were obtained at 3 feet below ground surface (bgs) and 45 feet bgs in this well. Chlorinated solvents were detected which included TCE (9,500 µg/L), 1,2 DCE (3,100 µg/L), tetrachloroethene (300 µg/L), vinyl chloride (440 µg/L), and acetone (1,700 µg/L).

2.3 PHYSICAL SETTING

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

2.3.1 Topography

The Site is located approximately 160 feet above mean sea level (msl). Topography at the Site is fairly level. To the east of the Site is the Palisades Sill, a prominent feature along the Hudson River. Topography begins to rise steeply in this direction at about ½ mile east of the Site. To the southwest, Several Lakes surround the Site and the Hudson River is approximately 4500 feet east of the Site. Figure 1.1 shows these features and the general topography of the surrounding area.

2.3.2 Climate

The climate of the area is characterized by warm summers and cool winters. Mean monthly temperatures range from 31 degrees Fahrenheit (°F) in January to 75°F in July. Average annual precipitation is 52 inches. Average annual snowfall is 30 inches per year (National Climatic Data Center, 1999).

2.3.3 Surface Water Hydrology

The Site is located on Route 9W and is within 200 feet of the Kill VonBeaste which connects Swartwout Lake with Rockland Lake. Rockland Lake is approximately 1,800 feet south of the Site. Swartwout Lake is approximately 800 feet west and Congers Lake is approximately 2400 feet southwest of the Site. Surface water flow begins at Rockland Lake, through the Kill VonBeaste to Swartwout Lake, then to Congers Lake.

2.3.4 Groundwater Hydrology

Groundwater at the Site is estimated to be within approximately four to six feet bgs, based on investigation results from previous site activities. Shallow groundwater flow is anticipated to flow northeast towards the Kill VonBeaste. Groundwater flow in the overburden is anticipated to be typical for well drained sand and gravel. Data provided during the UST removal (SII, 1990) indicated that MW-1 developed at a rate of 25 gallons per minute with a one foot drawdown, and MW-2 and MW-3 were rapidly hand bailed with no appreciable decrease in the static water level. Deeper groundwater flow may follow other local or regional flow patterns.

2.3.5 Geology

Overburden in the vicinity of the Site contains fine to medium sand and gravel with some gray silty clay sand according to the ESA (Ballard, 1998). Reference data provided in the UST removal reporting (SII, 1990) notes that the USDA Soil Conservation Service Classification and Correlation of soils of Rockland County, NY designate the Site soils as WuB, Weathersfield-Urban which consists of very deep, well drained soils of upland areas. This soil is glacial till derived from mainly red sandstone shale and conglomerate. Notes from the tank removal checklists indicate sand, clay and fill. Bedrock in the vicinity is anticipated to conglomerates, red sandstones, or red shale of the late Triassic or early Jurassic eras (NYSM, 1989). The Palisades sill to the east of the Site consists of diabase; however, this formation is not anticipated to be encountered. Bedrock is anticipated to be encountered at approximately 7 to 10 feet bgs based on the previous groundwater investigation (Ballard, 1999), using direct push refusal as the potential top of bedrock surface.

2.4 SITE WALKOVER

On February 7, 2008, representatives from MACTEC and the NYSDEC conducted a site visit to the Site. The Site walkover consisted of viewing the Site to assess possible contamination sources, exploration locations, and logistics for the field program (i.e., existing well locations, drilling and sampling locations and access feasibility). MACTEC also provided photo documentation of the Site (Site Photos will be included in the RI Report).

2.5 CONCEPTUAL SITE MODEL

Based on the review of the historical data, a CSM was developed. The conceptual model presents a description of the media affected, the source of impact, types of contamination, contaminants of potential concern, primary or secondary release mechanisms, migration pathways, and potential receptors. The conceptual model for the Site is presented in Table 2.1. The CSM will be modified and updated as needed based on data to be collected at the Site.

Historical data reviewed indicates that chlorinated solvents have migrating into soil, bedrock, and groundwater as a result of previous at the Site. Aromatic hydrocarbons have also migrated into soil, bedrock, and groundwater as a result of a gasoline UST leak in a presumed upgradient location form the Site. Groundwater is present at approximately four to feet bgs. Groundwater reportedly flows to the northeast in overburden; however groundwater flow direction(s) in bedrock (present at approximately 7 to 10 feet bgs) need to be determined.

Existing data indicate that groundwater contains concentrations of chlorinated solvents and aromatic hydrocarbons above applicable standards, criteria and guidance values (SCGs). Previous investigations did not fully define the extent of groundwater, soil, and potentially surface water, sediment, and indoor air contamination.

2.6 TECHNICAL OBJECTIVES

Based on existing data, chlorinated solvents and aromatic hydrocarbons are present in groundwater below and in the vicinity the Site at concentrations above the state Class GA groundwater standards as defined in 6 of New York Codes, Rules, and Regulations (NYCRR) Part 700-705 (NYS, 1999b). Contaminants detected are listed hazardous wastes under Title 6 of NYCRR Part 371 (NYS, 1999a). Based on this groundwater contamination, the Site poses a potential significant threat to public health and the environment as defined in 6 NYCRR 375 (NYS, 2006). Existing data reviewed was not sufficient to fully characterize the Site and therefore an RI will be performed. The RI will be performed with the following technical objectives:

- Evaluate source area soil (if encountered)/bedrock to determine if residual contamination still exists on the Site.
- Define the areal and vertical extent of contaminants in area groundwater, as well as evaluate groundwater flow direction and rate.

- Evaluate potential contaminant discharge to the adjacent steam at the Site and collect surface water and sediment samples.
- Collect commercial and residential sub-slab vapor and indoor air samples to determine if soil vapor migration is occurring and which direction(s).
- Evaluate present and future human health exposure pathways, such as through exposure to site source materials, groundwater, and/or vapor migration to indoor air.
- Evaluate the actual or potential impacts to fish and wildlife resources.

The RI field program described in Section 3 is planned to further characterize the Site based on the technical objectives listed above. This information will be used to evaluate the need for further action, including potential additional investigations and remedial evaluations.

3.0 SCOPE OF WORK

To evaluate the potential threat to human health and the environment, and to collect data for the future evaluate of remedial alternatives for the Site, field investigations are planned. These activities will evaluate soil, bedrock, groundwater, sediment, surface water, and soil vapor conditions at and downgradient of the Site. Specifically, data collection is necessary to complete the following:

- characterize the vertical and areal distribution of groundwater contamination;
- characterize the extent of sub-slab vapor contamination;
- evaluate migration pathways, and actual or potential receptors;
- determine whether residential mitigation systems are necessary; and,
- collect data for the future evaluation of potential remedial alternatives for the Site.

3.1 WORK PLAN AND BUDGET PREPARATION (TASK 1)

A task of the WA is the preparation of this WP and includes review of existing Site data, a historical review, a Site visit, and a scoping session with the NYSDEC. A preliminary historical records review was conducted during the preparation of this WP. A Site reconnaissance and scoping session was conducted on February 7, 2008 with the NYSDEC. To the extent practical, MACTEC will collect additional information, as needed, to augment the existing data. Additional information may include additional aerial photographs, historic investigation reports, and other historical data.

3.2 REMEDIAL INVESTIGATION (TASK 2)

The RI fieldwork is anticipated to be conducted as described in the following subsections. The RI fieldwork will be conducted in accordance with the specifications presented in the Quality Assurance Program Plan (QAPP) (MACTEC, 2007), a stand-alone document, and the Site-specific QAPjP, included as Appendix A to this WP. Quality Control (QC) and Quality Assurance (QA) procedures for sample handling and sample shipment are presented in Section 5.0 of the QAPjP. QA/QC sample frequencies are presented in the Site-specific QAPjP. Health and Safety procedures for on-Site activities are presented in the Program HASP (MACTEC, 2005) and the Site-specific HASP, included as Appendix B to this Site WP. The CPP is included as Appendix C to this WP.

Off-Site laboratory water analyses will be performed by Mitkem, a New York State Department of Health (NYSDOH) approved laboratory and off-Site sub-slab vapor and indoor/ambient air analyses will be performed by Contest, a NYSDOH approved laboratory. Off-Site laboratory analysis will comply with the NYSDEC Analytical Services Protocols (ASP) (NYSDEC, 2005). Laboratory analytical detection limits are included in Appendix C.

Proposed sampling techniques and rational are provided in Table 3.1, and sample identification and analyses is presented in Table 3.2.

The data reviewed from the previous investigations will be used to refine the data collection needs of the assessment. General field activities, including mobilization, health and safety, and decontamination, are described in the following subsections. Upon approval of the WP, MACTEC will begin procurement of subcontractors.

3.2.1 General Field Activities

The general field activities to be completed, including mobilization, health and safety, and decontamination, are described in the following subsections. Upon approval of the WP, MACTEC will complete procurement of subcontractors and begin mobilization. MACTEC and its subcontractors will mobilize to the Site and begin the RI fieldwork in accordance with the project schedule. Mobilization will include obtaining utility clearances and acquisition of the following:

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

Initially a field team orientation meeting will be held on-Site prior to work start-up with MACTEC and subcontractor personnel to familiarize field workers with Site history, health and safety requirements, equipment calibration procedures, and all other investigation methods and procedures. The NYSDEC will be responsible for obtaining Site access prior to initiation of work activities.

3.2.1.1 Health and Safety

MACTEC anticipates that the RI fieldwork will be conducted at Level D personal protection. Specific investigation activities and required level of personal protection are set forth in the Site-specific HASP (Appendix B). 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 re-evaluated by the NYSDEC and MACTEC.

3.2.1.2 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. United States Department of Transportation 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 as described in the Site-specific QAPjP.

3.2.1.3 Site Survey and Base Map

MACTEC's survey subcontractor will complete a survey of the newly installed wells. Horizontal and vertical locations will be presented to MACTEC in a database to be used with geographic information system software and no formal survey of the Site and surrounding area with a CAD drawing is anticipated. Locations of other sampling locations, such as background soil samples will be surveyed using a Trimble Global Positioning Satellite. Sample locations will be presented on an aerial photograph of the Site and surrounding area. Horizontal locations will be tied to the NYS Plane Coordinate System using North American Datum of 1983.

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. Horizontal well measurements will be to an accuracy of 0.1 foot.

3.2.1.4 Field Program Sampling Activities

Figure 3.1 is an aerial photograph of the Site area and proposed sampling locations. Table 3.1 provides the proposed field tasks; Table 3.2 presents sample parameters, and specific analyses. Currently, the field program is anticipated to include the following (see Table 3.1 for sampling rationale):

- Perform borehole geophysics and passive diffusion sampling for VOCs (up to four samples) in the inactive water supply well.
- Collect 13 sub-slab vapor samples from the Site building and adjacent commercial buildings.
- Install seven overburden wells and five bedrock monitoring wells. Five of the overburden wells will be paired with a bedrock well.
- Collect groundwater samples from the 12 new wells for VOC, semivolatile organic compound (SVOC), and Target Analyte List (TAL) metals analyses, plus a subset for pesticides and polychlorinated biphenyls (PCB) analyses.
- Collect a soil sample from each of the overburden monitoring wells for VOC, SVOC, and TAL metals analyses, plus a subset for pesticides and PCB analyses.
- Collect six surface water and sediment samples from selected catch basins in the storm drain system at the Site and at two stream locations (one upgradient and one down gradient) in the stream adjacent to the Site (Kill Von Beaste) for VOC, SVOC, TAL metals, and pesticide/PCB analyses.
- Collect five background soil samples for TAL metals analysis.
- Collect indoor/ambient air and sub-slab vapor samples from up to 12 residences surrounding the Site.

3.2.2 Borehole Geophysics and Supply Well Sampling

A series of standard geophysical logging suites will be completed within individual open bedrock boreholes to determine bedrock structure and the presence of water bearing fractures. Logging will be completed in two separate phases. The first phase will log the inactive water supply well. Data obtained from the inactive water supply well will be used to assist in determining the vertical location of five bedrock wells. These wells may be logged pending the results of geophysical logging of the inactive water supply well and analytical results from the five new bedrock wells. Scope, however, for this additional logging has not been included at this time.

A series of borehole geophysical logging suites will be completed to locate water bearing fractures and to map the attitude of observed fractures. These logging suites include the following and will be generally completed in the following sequence:

- Acoustic Televiewer
- Optical Televiewer
- Fluid Temperature and Fluid Resistivity
- Caliper
- Single-point resistance and spontaneous potential
- Heat-pulse Flowmeter (non-pumping and pumping conditions)

Acoustic televiewer and optical televiewer data will be collected to determine the location and attitude of fractures exposed in each bedrock borehole. Caliper data will be used to measure the diameter of the borehole. Deviations in borehole diameter indicate the presence of fractures leaving breakouts in the borehole wall. Caliper data will also be used to locate packer intervals for a proper seal. Electrical logs indicate the presence of hydraulically active fractures and possible changes in lithology. Heat-pulse flowmeter logging completed under non-pumping (ambient) and pumping conditions will be used to determine the location of water bearing fractures under non-stressed and stressed conditions. Natural gamma data will also be recorded. These data values are correlated with single-point resistance logs when distinguishing sandy versus clayey strata (whether overburden or rock), and are obtained with the same logging probe that records the single-point resistance and spontaneous potential data.

In addition to the borehole geophysics, up to four passive diffusion bag samplers will be placed into the inactive water supply well at locations where potential contaminant flow may be occurring based on the geophysical logging data. The bags will be allowed to sit in place for a minimum of two weeks. Samples will be will be analyzed for VOCs by USEPA Method 8260 as described in the NYSDEC ASP of June 2005 (NYSDEC, 2005). This data will also be used to assist in determining the vertical location of five bedrock wells.

3.2.3 Groundwater Monitoring Well Installation

To determine groundwater flow characteristics and quality downgradient of the Site and better define the groundwater plume, seven overburden and five bedrock groundwater monitoring wells will be installed. Groundwater analytical data and permanent data monitoring points will assist in determining the extent of potential chlorinated solvent contamination in the vicinity south of the Site, and to allow monitoring of that contamination. Hydraulic testing of the wells will be conducted to calculate groundwater hydraulic conductivity values for the overburden and shallow bedrock.

Seven 2-inch shallow overburden monitoring wells (MW-1 to MW-7) are proposed to quantitatively characterize shallow groundwater quality (Figure 3.1). The exact locations of the wells may vary based on property access. Monitoring wells are anticipated with five-foot screens set above bedrock.

Each overburden monitoring well boring will be advanced using hollow stem auger (HSA) drilling techniques to top of bedrock. Soil samples will be collected continuously to bedrock using 2-inch split spoons. Photoionization detector (PID) headspace readings will be used to screen soil samples for the presence of VOCs as each soil sample is removed from the split-spoon. 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 4.5.2.2 of the QAPP.

The overburden monitoring wells will be constructed of 2-inch inside diameter schedule 40 PVC with either five foot or ten foot well screens (depending on depth to bedrock and groundwater) and threaded flush joint riser in accordance with Subsection 4.4.4 of the QAPP (MACTEC, 2007). Well screens will have 0.010-inch wide machine slots (unless geologic conditions dictate otherwise) with # 0 sand pack to 2 feet above the screen, a two foot bentonite seal above the sand pack and a bentonite grout backfill to the ground surface. The wells will be completed with a locking cap and a six-inch flush mount cover, or three foot riser, depending on location, with a two foot concrete apron.

Five bedrock monitoring wells (MW-3B to MW-7B) will be installed up to approximately 50 feet bgs (approximately 40 feet into bedrock), using telescoping techniques to ensure any potential overburden confining layer remains intact. The five bedrock borings will be advanced to the top of bedrock using HSA techniques, as described for the overburden wells. The top 1.5 feet of rock will be drilled using a

6 ¼ tri-cone bit, to allow the setting of a 4-inch steel casing grouted into bedrock. Once set, one borings will be continued using HX-size rock coring equipment up to 40 feet into rock to evaluate the potential for water bearing fractures below the shallow weathered bedrock zone. Rock cores will be described using the procedures outlined in Section 4.4.3.5 of the QAPP (MACTEC, 2007). Drilling techniques are described in Subsection 4.4.3 of the QAPP (MACTEC, 2007).

An alternate drilling method to the drilling methods noted above may be used based on the results of the borehole geophysics described in Section 3.2.2. Rotosonic drilling using a mini-sonic drill rig may be used as the alternate drilling method should the bedrock characteristics be determined to be conducive to sonic drilling. The NYSDEC will be consulted with by MACTEC regarding this decision.

The bedrock wells will be either open hole or constructed of 2-inch inside diameter schedule 40 PVC with 10-foot well screens and threaded flush joint riser in accordance with Subsection 4.4.4 of the QAPP (MACTEC, 2007). Well screens will have 0.010-inch wide machine slots (unless geologic conditions dictate otherwise) with # 0 sand pack to 2 feet above the screen, a two foot bentonite seal above the sand pack (ensuring to seal the bedrock/overburden interface), and grout backfill to the ground surface. The wells will be completed with a locking cap and a six-inch flush mount cover or a three foot riser (depending on location) with a two foot concrete apron.

3.2.4 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).

3.2.5 Groundwater Sampling and Conductivity Testing

After monitoring wells have been installed and developed, groundwater samples will be collected from up to 12 wells (7 overburden and 5 bedrock wells). In addition, two samples will be collected from the inactive water supply well, based on the passive diffusion bag sample results. Groundwater analytical

data will be used to assess the distribution of potential contamination in the vicinity of the Site, and to allow monitoring of that contamination, if present. See Figure 3.1 and Table 3.1, respectively, for proposed locations and sample collection and analysis rationale. The first round of groundwater samples will be collected no sooner than two weeks following the development of the monitoring wells. Prior to well sampling, a round of water levels will be collected. Monitoring wells will then be sampled using low-flow sampling procedures as described in the Section 4.5.4.3.2 of the QAPP (MACTEC, 2007). Samples will be collected from the least contaminated to the most contaminated locations as determined from the assumed groundwater flow direction and historic analytical data. Field measurements for pH, temperature, specific conductivity, oxidation reduction potential, dissolved oxygen, and turbidity will be collected through a flow through cell (with the exception of turbidity) from each well during pre-sample purging.

Groundwater samples from all wells will be analyzed for VOCs by USEPA Method 8260, dissolved TAL metals by USEPA Methods 6010B/7470, and SVOCs by USEPA Method 8270 as described in the NYSDEC ASP of June 2005 (NYSDEC, 2005). Samples will be analyzed for pesticides and PCBs by USEPA Methods 8081 and 8082 at selected wells (see Table 3.2). Groundwater for metals analyses will be field filtered using dedicated 0.5 micron filters. The laboratory will provide NYSDEC Category B deliverables.

Upon completion of the first groundwater sampling event, hydraulic conductivity tests will be performed on the new monitoring wells to characterize shallow overburden and bedrock characteristics. The procedures for conducting the hydraulic conductivity tests are presented in Subsection 4.7.2 of the QAPP (MACTEC, 2007). The hydraulic conductivity tests will consist of slug tests, using a solid mass of PVC (the slug) and a data logger. For wells with screens installed across the water table, two rising head tests will be conducted at each well. For wells with screens installed below the water table, one rising and one falling head test will be conducted at each well. Hydraulic conductivity test data will be analyzed by the methods of Hvorslev (1951) and Bouwer and Rice (1976).

3.2.6 Soil Sampling

During the drilling for the installation of overburden wells, a soil sample from each location will be obtained for analysis. Selection of the soil sample to be analyzed will be based on visual, olfactory,

and PID data. Samples will be analyzed for VOCs by USEPA Method 8260, TAL metals by USEPA Methods 6010B/7470, and SVOCs by USEPA Method 8270 as described in the NYSDEC ASP of June 2005 (NYSDEC, 2005). Samples from selected wells will also be analyzed for pesticides and PCBs by USEPA Methods 8081 and 8082 (see Table 3.2).

To provide background data regarding metals in soil, five samples will be obtained at "background" locations to be determined and approved by the NYSDEC and NYSDOH. Samples will be obtained by hand auger below the upper surface soil horizon. Samples will be analyzed for TAL metals by USEPA Methods 6010B/7470.

3.2.7 Surface Water and Sediment Sampling

To evaluate potential contaminant migration from the Site by the surface water and sediment pathways, four surface water and sediment samples will be obtained from selected catch basins at the Site. Two samples will also be obtained in the stream adjacent to the Site (Kill Von Beaste); one location where storm water enters the stream from the Site, and one upgradient from the Site. Figure 3.1 shows these locations. Samples will be analyzed for VOCs by USEPA Method 8260, SVOCs by USEPA Method 8270, dissolved (for surface water) TAL metals by USEPA Methods 6010B/7470, and Pesticides and PCBs by USEPA Methods 8081 and 8082 as described in the NYSDEC ASP of June 2005 (NYSDEC, 2005). Sediment will also be analyzed for total organic carbon.

3.2.8 Indoor Air and Sub-Slab Vapor Sampling

Initial sub-slab vapor grab sampling will be obtained at the Site building and five adjacent commercial buildings (adjacent buildings consist of two storage facilities, two office buildings and a motel). Samples will be obtained over an approximate ½ hour period (flow rate will be less than 0.2 liters per minute as required by NYSDOH) and collected as described below, other than the time period. The purpose of this sampling is to provide a soil vapor "foot print" to assist in the location of follow up monitoring wells. Figure 3.1 shows the location of these facilities.

After field data gathering has been completed, approximately 12 residences to the north and west of the Site may be sampled for indoor air and sub-slab vapor. In addition, the Site building and 4 of the 5

adjacent commercial buildings will also be sampled. The commercial building not proposed for full suite sampling is a large warehouse which is frequently open to outdoor air.

Prior to collecting samples, an indoor air survey will be completed using the NYSDOH "Indoor Air Quality Questionnaire and Building Inventory" form. Sample collection procedures are further described in the QAPP. Vapor samples will be collected from below the building concrete slab. A one-inch diameter hole will be drilled with a hammer drill two inches into the building floor, near the center of the basement/slab-on grade, but away from any cracks or sumps. The hole will be continued with a 3/8-inch drill bit, until the building slab is penetrated. The hole will be continued approximately 3-inches below the slab. The hole will then be swept to remove drill cuttings/dust from the area. A ¼-inch piece of Teflon or laboratory/food grade tubing will be inserted through a 1" diameter rubber stopper, and placed into the hole, so that the bottom of the tubing is below the slab floor and the stopper rests inside the one-inch hole, forming a seal (ensuring that the bottom of the tubing does not become blocked with dirt/concrete at the bottom of the hole). The stopper will then be covered with bees wax to provide a seal to prevent the migration of indoor air into the sub-slab. One 60 cubic centimeter volume of air will be purged from the tubing with a polyethylene syringe. The syringe will be capped and the air released outside the building as to not interfere with the indoor air sample collection. A 6-liter SUMMA®-type canister with a 24-hour flow valve will be connected to the tubing as described in the QAPjP.

Basement indoor air samples (or first floor air samples if slab on-grade) will be collected in 6-liter SUMMA®-type canisters from the vicinity of the sub-slab vapor sample collection points. MACTEC will collect the basement air sample away from any sumps, and if standing water is present it will be noted on the sampling form. If standing water is present, samples will be obtained and analyzed for VOCs by USEPA Method 8260. Indoor air samples will be collected from approximately four to six feet above the floor level (if necessary, Teflon or laboratory/food grade tubing will be extended from the canister to attain the proper intake height). Indoor air samples will be set up with 24-hour flow valves.

Ambient air samples will be collected in 6-liter SUMMA®-type canisters from the vicinity of the homes being sampled for indoor air and sub-slab vapor VOC contamination. Samples will be collected from approximately four to six feet above ground surface. Ambient air samples will be set up with 24-hour flow valves.

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

Approximately 24 hours after sample collection, the flow valves will be shut off. The time, remaining vacuum in the canister and barometric pressure will be noted on the field data record. The samples will be shipped to Con-test for analyses of VOCs via USEPA Method TO-15 with a detection limit of 1 microgram per cubic meter ($\mu g/m^3$) for most compounds. If TCE, vinyl chloride, and carbon tetrachloride are not detected at 1 $\mu g/m^3$ in indoor/ambient air these samples will be re-analyzed for these three compounds using a detection limit of 0.25 $\mu g/m^3$. The compound list (including method detection limits) is included in Appendix A.

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

3.2.9 Remedial Investigation Report

Upon completion of the field investigations and receipt of analytical data, MACTEC will prepare an RI Report. The RI Report will include a summary of the Site background and history including results of investigations conducted prior to the RI. Additional background information reviewed during subsequent tasks will be included. The RI Report will summarize results of the field investigations and laboratory analytical activities performed during field work. Boring logs and environmental sampling data will be included as appendices to the RI Report. The information provided in the RI Report will be used to prepare a FS to evaluate remedial alternatives for the Site.

Two hard copies of the Draft and two hard copies of the Final RI Report will be sent to the NYSDEC Project Manager, Central Office, Albany. In addition, one copy of each report will be submitted in electronic format. Reports will be issued in both confidential version (containing personal addresses) and non confidential versions (containing coded sample IDs and locations). Laboratory and location information will also be submitted in the NYSDEC database format. The Draft report will be submitted for review and comment by the NYSDEC. The Final report will incorporate the NYSDEC

review comments. The NYSDEC will be responsible for forwarding copies of the report to other state and county agencies.

3.3 FEASIBILITY STUDY (TASK 3)

A FS will be completed to evaluate the most applicable remedial alternatives. Prior to proposing a remedy for the Site, Remedial Action Objectives will be developed. The proposed remedy for the Site will be aimed at restoring the Site to pre-release conditions, or, at a minimum, eliminating or mitigating all significant threats to public health and the environment posed by the contaminants. Scientific and engineering principles will be applied to determine the most appropriate remedy for the Site, with the goal of protecting public health and the environment and complying with the state SCGs. The proposed remedial action will be based on the criteria outlined in 6 NYCRR 375.

3.4 SUPPORT ACTIVITIES

Based on the location of the field activities being in a residential community, it is likely that public meetings may be necessary. MACTEC will assist the NYSDEC, as needed, in preparation and review of any documents/presentations for technical accuracy, as well as preparing specialized figures or diagrams for insertion. MACTEC is anticipated to attend the public meetings and provide figures and drawings placed on poster board for the NYSDEC use.

4.0 PROJECT ORGANIZATION

Project organization, including principal functions and responsibilities, are described below.

Program Manager – William Weber, P.E. Mr. Weber has overall responsibility for organizing and setting program operating procedures with the NYSDEC, and confirming that WAs are implemented in accordance with contract requirements.

Project Manager – John Peterson. Mr. Peterson will be the primary contact with Mr. Randy Witcher, the NYSDEC Project Manager. He will be responsible for establishing protocols to be used on the WA and confirming implementation, for maintaining quality and consistency within the RI reports, and for monitoring the overall WA schedule and budget.

Site Manager/RI Lead – Chuck Staples. Mr. Staples is responsible for managing execution of the Site scope of work and for task-specific budgeting and scheduling issues. During field activities, Mr. Staples will be the liaison among field staff, subcontractors, and representatives from the NYSDEC, and county or municipal agencies.

FS and Interim Remedial Measure (IRM) Lead – Ryan Belcher, P.E. Mr. Belcher is responsible for managing the FS and potential IRM (if required). He will provide the potential remedial alternatives, recommend those alternatives that will receive a detailed evaluation, provide a detailed analysis, and recommend a preferred alternative. Mr. Belcher will also oversee implementation of IRMs if required.

Human Health Exposure Assessment - Jay Peters. Mr. Peters will be responsible for the qualitative exposure assessment and characterization of the exposure setting.

Ecological Exposure Assessment – Chuck Lyman. Mr. Lyman is responsible for the qualitative exposure assessment and the identification fish and wildlife resources and potential exposure pathways regarding to natural resources.

Analytical Laboratory – Mitkem is a NYSDOH National Environmental Laboratory Accreditation Program (NELAP) approved laboratory. They will provide analytical services for water and soil sample analyses (soil samples not currently anticipated). Con-test (woman-owned business enterprise)

is a NYSDOH NELAP approved air laboratory. They will provide analytical services for sub-slab vapor and indoor/ambient air analyses.

Data Validation – Environmental Data Validators, Inc. (minority business enterprise [MBE]) will provide data validation services for the project.

Drilling Subcontractor – Geologic NY is a NYS certified driller on MACTEC's NYSDEC standby drilling and direct push contract list. They were selected based on cost effectiveness and ability to meet the project schedule, and will provide both drilling services.

Geophysical Subcontractor – Geophysical Application will provide borehole geophysical services.

IDW Disposal Subcontractor –Clean Harbors will provide disposal services for Site IDW.

Survey Subcontractor – YEC (MBE) will provide surveying services for the Site.

Data Manager – Brad Schoonard. Mr. Schoonard will participate in data management and report production.

Project Assistant – Bryanna Stiles. Ms. Stiles will also assist with the management of files, data, and report production.

Health and Safety – Cynthia Sundquist, CIH. The Health and Safety Supervisor, is responsible for review and approval of the Site-specific HASP, and, throughout the duration of field activities, has authority to stop work should unacceptable health and safety risks occur. The on-Site Health and Safety Officer will be appointed when the field investigation schedule is finalized.

5.0 PROJECT BUDGET, SCHEDULE AND ASSUMPTIONS

The proposed project schedule for the RI is provided and shown in Figure 5.1.

The proposed schedule for execution of this project depends upon scheduled NYSDEC review and comment on deliverables, and the NYSDEC confirmation of Site access approval. Cost tables are provided in Appendix E (which is provided under separate cover).

The project schedule and costs are dependent on the following assumptions:

- No laboratory data validation, other than the NYSDEC Data Usability Summary Report will be required for the project.
- The NYSDEC will acquire permission from property owners to gain access for the subsurface investigations.

6.0 REFERENCES

Ballard Engineering Consulting, P.C. (Ballard), 1999. Subsurface Investigation Report. Prepared for Bram Manufacturing Corporation, Congers, New York. January 1999.

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Team Environmental Consultants, Inc. (TEAM), 1998. Phase I Environmental Site Assessment Report. Prepared for the Stierlen and Bram properties, Congers, New York. October 1998.

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FIGURES

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

Prepared/Date: BRP 03/25/08
Checked/Date: JWP 03/25/08

RI/FS WORK PLAN
BRAM MANUFACTURING
CONGERS, NEW YORK

MACTEC

SITE LOCATION MAP

Project 3612-08-2098
Figure 1.1

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GW-B8
GW-B7
GW-PW
GW-B1
GW-B3
GW-B2
GW-B6
GW-B5
GW-B4
MW-S1
MW-S2
MW-S3

Legend

- Existing Monitoring Well
- Existing Inactive Water Supply Well
- Previous UST Excavation Area
- Catch Basin
- Storm Sewer

N

0 40 80 Feet

Prepared/Date: BRP 03/27/08
Checked/Date: JWP 03/27/08

RI/FS WORK PLAN
BRAM MANUFACTURING
CONGERS, NEW YORK

MACTEC

PREVIOUS SAMPLE LOCATIONS

Project 3612-08-2098
Figure 2.1

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RI/FS WORK PLAN
BRAM MANUFACTURING
CONGERS, NEW YORK

MACTEC

PROPOSED SAMPLE LOCATIONS

Project 3612-08-2098
Figure 3.1

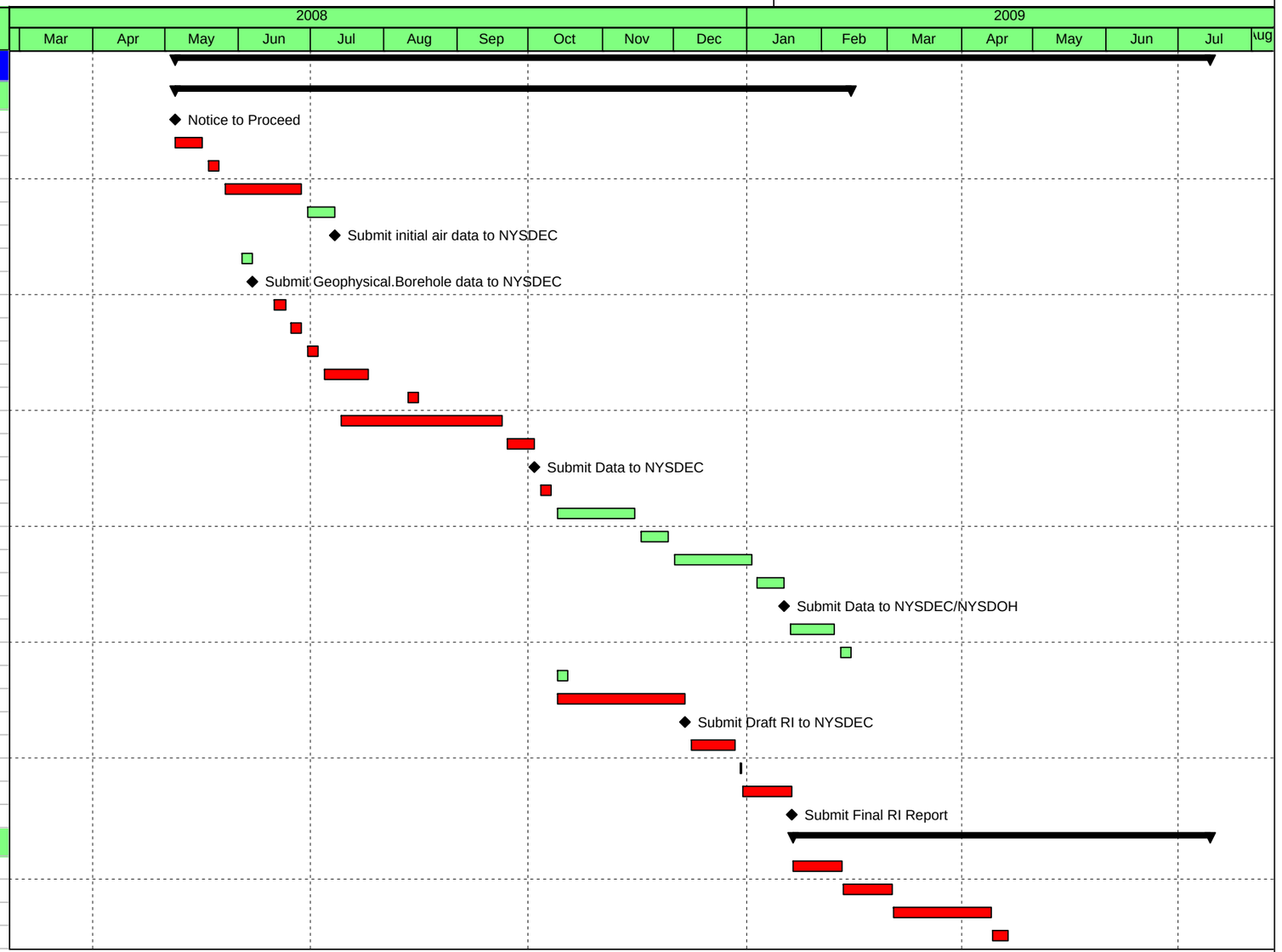
25-Apr-08

Figure 5.1

Bram Manufaturing RI/FS

Project Schedule

Activity ID	Activity Name	Original Duration	Start	Finish
Bram Manufaturing RI/FS		303	05-May-08	14-Jul-09
Task 2 - Remedial Investigation		198	05-May-08	13-Feb-09
02.1000	Notice to Proceed	0	05-May-08*	
02.1010	Mobilization/Subcontracting	10	05-May-08	16-May-08
02.1020	Initial Air Sampling & Geophysics	5	19-May-08	23-May-08
02.1030	Lab Analysis	25	26-May-08	27-Jun-08
02.1040	DUSR	10	30-Jun-08	11-Jul-08
02.1050	Submit initial air data to NYSDEC	0		11-Jul-08
02.1060	Review Geophysical/Borehole Data	5	02-Jun-08	06-Jun-08
02.1070	Submit Geophysical.Borehole data to NYSDEC	0		06-Jun-08
02.1080	Review prliminary air data	5	16-Jun-08	20-Jun-08
02.1090	Review RI well locations with NYSDEC	5	23-Jun-08	27-Jun-08
02.1110	Site Clearance	5	30-Jun-08	04-Jul-08
02.1111	Drilling, SW/SD, & Soil Sampling	15	07-Jul-08	25-Jul-08
02.1121	MW Sampling & Survey	5	11-Aug-08	15-Aug-08
02.1131	Laboratory Analysis	50	14-Jul-08	19-Sep-08
02.1141	DUSR	10	22-Sep-08	03-Oct-08
02.1151	Submit Data to NYSDEC	0		03-Oct-08
02.1161	Review Data with NYSDEC/NYSDOH	5	06-Oct-08	10-Oct-08
02.1171	Notify Residences	25	13-Oct-08	14-Nov-08
02.1181	Air Sampling	10	17-Nov-08	28-Nov-08
02.1191	Laboratory Analysis	25	01-Dec-08	02-Jan-09
02.1201	DUSR	10	05-Jan-09	16-Jan-09
02.1211	Submit Data to NYSDEC/NYSDOH	0		16-Jan-09
02.1221	NYSDEC/NYSDOH Review	15	19-Jan-09	06-Feb-09
02.1231	Scope additional air sampling (if necessary)	5	09-Feb-09	13-Feb-09
02.3000	Phase 2 RI Scoping with NYSDEC (If Necess...	5	13-Oct-08	17-Oct-08
02.4000	Prepare Draft RI Report	40	13-Oct-08	05-Dec-08
02.4010	Submit Draft RI to NYSDEC	0		05-Dec-08
02.4015	NYSDEC Review	15	08-Dec-08	26-Dec-08
02.4020	Receive NYSDEC Comments	1	29-Dec-08	29-Dec-08
02.5000	Prepare Final RI Report	15	30-Dec-08	19-Jan-09
02.5015	Submit Final RI Report	0		19-Jan-09
Task 3 - Feasibility Study		124	20-Jan-09	14-Jul-09
03.1000	Development of Remedial Alternatives	15	20-Jan-09	09-Feb-09
03.1005	Preliminary Screening of Alternatives	15	10-Feb-09	02-Mar-09
03.1025	Detailed Analysis of Alternatives	30	03-Mar-09	13-Apr-09
03.1030	Remedy Selection	5	14-Apr-09	20-Apr-09



Actual Work
Remaining Work
Critical Remaining Work
Milestone
Summary

NYSDEC project schedule Layout

MACTEC

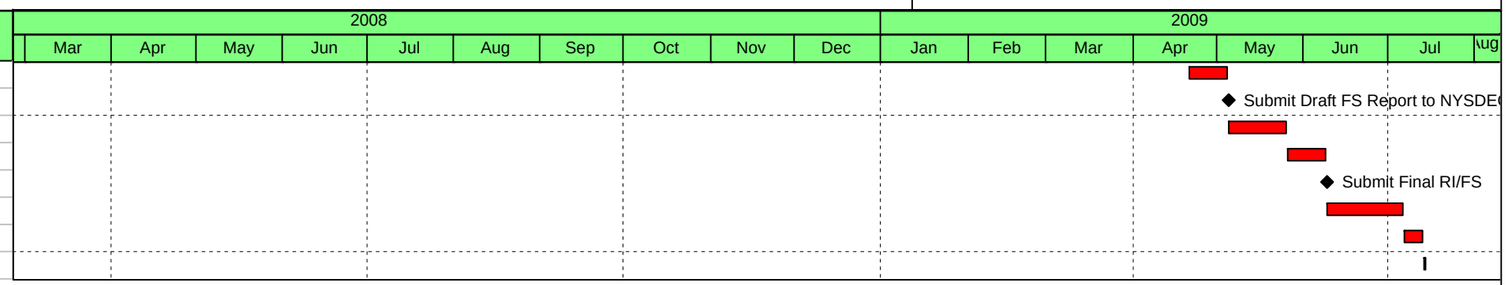
25-Apr-08

Figure 5.1

Bram Manufaturing RI/FS

Project Schedule

Activity ID	Activity Name	Original Duration	Start	Finish
03.1035	Prepare Draft RI/FS Report	10	21-Apr-09	04-May-09
03.1040	Submit Draft FS Report to NYSDEC	0	05-May-09	
03.1045	NYSDEC Review Draft FS	15	05-May-09	25-May-09
03.1050	Prepare Final RI/FS	10	26-May-09	08-Jun-09
03.1055	Submit Final RI/FS	0	09-Jun-09	
03.1060	NYSDEC Prepares PRAP	20	09-Jun-09	06-Jul-09
03.1065	Prepare for FS Public Meeting	5	07-Jul-09	13-Jul-09
03.1070	Conduct/Attend Public Meeting	1	14-Jul-09	14-Jul-09



Actual Work
Remaining Work
Critical Remaining Work
Milestone
Summary

NYSDEC project schedule Layout

MACTEC

TABLES

Table 2.1: Conceptual Site Model

Media	Known or Suspected Source of Contamination	Type of Contamination (General)	COPCs (Specific)	Primary or Secondary Source Release mechanism	Migration Pathways	Potential Receptors
Soil	Former operations. Spills or disposal of solvents which may be under a newer portion of the Site building	Solvents & fuels	TCE; 1,2 DCE; PCE; vinyl choride, trimethylbenzene, acetone,ethylbenzene, propylbenzene, xylenes	Leaks and or Spills	Infiltration / percolation	Human: direct contact if excavation occurs in contaminated area (s)
Groundwater	Contaminated Soil and bedrock (Secondary Source)	Solvents & fuels	TCE; 1,2 DCE; PCE; vinyl choride, trimethylbenzene, acetone,ethylbenzene, propylbenzene, xylenes	Infiltration / percolation from contaminated soil and bedrock	Groundwater flow	Private water supply wells are not anticipated to be located in the vicinity of the Site. Human or ecological receptors are not expected to be exposed.
Air /Soil Vapor	Contaminated soil and bedrock at the Site and contaminated groundwater downgradient from the Site.	Solvents & fuels	TCE; 1,2 DCE; PCE; vinyl choride, trimethylbenzene, acetone,ethylbenzene, propylbenzene, xylenes	Volatilization of contaminants from soil, bedrock, and groundwater	Migration into buildings / residences	Human: Inhalation
Surface Water and Sediment	Contaminated soil and bedrock (secondary source)	Solvents & fuels	TCE; 1,2 DCE; PCE; vinyl choride, trimethylbenzene, acetone,ethylbenzene, propylbenzene, xylenes	Contaminants in groundwater at potential discharge points (Kill Von Beaste and nearby lakes). Contaminants dicharging from the storm sewer system into the Kill Von	Surface water flow and sediment transport	Human or ecological receptors are potentially exposed if contamination is present in off-site surface water and sediment.

Notes:
COPCs = contaminants of potential concern
TCE = Trichloroethene
DCE = Dichloroethene
PCE = Tetrachloroethene

Prepared by: CRS 3/27/08
Checked by: JWP 3/27/08

Table 3.1: Proposed Field Tasks and Methodology

LOCATION TYPE	LOCATION ID	DESCRIPTION AND METHODOLOGY	RATIONALE	ANALYTICAL
Sub Slab Vapor	SV-1A through SV-6A; IA/SV-1A, IA/SV-1C, IA/SV-2A through IA/SV-18A	Collect initial sub-slab vapor samples from commercial structures on and immediately adjacent to the site.	Initial sub slab samples will be obtained to provide data regarding the soil vapor "foot print" at the site and potential source area(s).	TCL VOCs
Sub Slab Vapor and Indoor Air	IA/SV-1A, IA/SV-1C, IA/SV-2A through IA/SV-18A (locations to be determined)	Collect follow-up indoor air and sub-slab vapor samples from commercial structures on and immediately adjacent to the site and from selected residences adjacent to the site.	Follow-up indoor air and sub slab vapor samples will be obtained to provide data regarding vapor migration pathways and potential exposure points.	TCL VOCs
Surface Water & Sediment	SW/SD-1 through SW/SD-6	Collect surface water and sediment data from selected catch basins on and adjacent to the site (SW/SD-1 through SW/SD-4), at the storm drain outfall (SW/SD-5) into an adjacent stream, and at an upgradient location (SW/SD-6) in the adjacent stream.	Catch basin data will provide information regarding potential source area(s) and whether the storm drain system has been impacted by site contamination. Stream samples will provide data regarding the potential impact of the storm drain outfall on the adjacent stream and upgradinet data.	TCL VOCs, SVOCs, and metals at all locations. PCBs at selected locations.
Buil;ding Sumps	SW-7 thorugh SW-18	Collect surface water data from building sumps where standing water is present.	Provide data regarding potential exposure to building sump water	TCL VOCs
Abandoned on-site water supply well	GW-PW	Survey the abandoned on-site water supply well using borehole geophysics (Acoustic Televiewer, Optical Televiewer, Fluid Temperature and Fluid Resistivity, Caliper, Single-point resistance and spontaneous potential, and Heat-pulse Flowmeter (non-pumping and pumping conditions).	Provide data regarding bedrock features such as fracture zones. Groundwater flow in fractures will also be determined. This data will be used as a guide for additional bedrock borings/monitoring wells.	Not applicable
Abandoned on-site water supply well	GW-PW	After the geophysical survey of the abandoned on-site water well is completed, install up to 4 passive bag diffusion samplers in zones of potential contaminant transport.	Provide data regarding contaminant flow in bedrock and identify the zone(s) where this may be occuring.	TCL VOCs
Hand Boring	BS-BK1 through BS-BK5	Hand borings to obtain soil samples.	Provide five soil samples to provide background values for metals in soil.	metals
Soil Boring	BS-1 to BS-7 (MW locations)	Complete 7 borings to approximately 10 feet bgs (approximately 5 feet into the water table), collecting continuous soil samples for analysis and visual inspection.	Evaluate subsurface soil characteristics and potential source areas.	TCL VOCs, SVOCs, and metals for one sample from each soil boring, and PCBs at selected locations.
Monitoring Well	MW-1 to MW-7 and MW-3B to MW-7B	Install monitoring wells in 7 soil borings and 5 bedrock borings to collect groundwater samples.	Wells installed to define the distribution of groundwater contamination in overburden and bedrock at and adjacent to the site. Wells will also be used to provide data regarding groundwater flow direction(s) and groundwater permeability data and gradients. Data from the wells will also be used to help determine follow-up indoor air/subslab vapor sampling locations.	TCL VOCs, SVOCs, and metals at all locations, and PCBs at selected locations.

NOTES:

TCL	Target Compound List
VOCs	Volatile Organic Compound analyzed by USEPA Method 8260
SVOCs	Semi-Volatile Organic Compounds analyzed by USEPA Method 8270.
PCBs	PCBs analyzed by USEPA Method 8082.
Metals	TAL metals analyzed by USEPA Methods 6010/7470.

Prepared by: JWP
Checked by: CRS

Table 3.2: Proposed Sample Identification and Analyses

				Water Samples				Soil/Sediment/Samples					Air Samples
Site Type	**Media**	**Site ID**	**Sample ID**	**VOCs**	**SVOCs**	**Pest PCBs**	**TAL Metals**	**VOCs**	**SVOCS**	**Pest PCBs**	**TAL Metals**	**TOC**	**VOCs (TO-15)**
Indoor Air and Soil Vapor													
Initial Sampling													
Building	Soil Vapor	SV-1A	344055-SV-1A										1
Building	Soil Vapor	SV-1B	344055-SV-1B										1
Building	Soil Vapor	SV-1C	344055-SV-1C										1
Building	Soil Vapor	SV-1D	344055-SV-1D										1
Building	Soil Vapor	SV-2A	344055-SV-2A										1
Building	Soil Vapor	SV-3A	344055-SV-3A										1
Building	Soil Vapor	SV-3B	344055-SV-3B										1
Building	Soil Vapor	SV-3C	344055-SV-3C										1
Building	Soil Vapor	SV-4A	344055-SV-4A										1
Building	Soil Vapor	SV-4B	344055-SV-4B										1
Building	Soil Vapor	SV-4C	344055-SV-4C										1
Building	Soil Vapor	SV-5A	344055-SV-5A										1
Building	Soil Vapor	SV-6A	344055-SV-6A										1
Building	Soil Vapor	Duplicates	TBD										1
Follow Up Sampling													
Building	Indoor Air	IA-1A	344055-IA-1A										1
Building	Soil Vapor	SV-1A	344055-SV-1A										1
Building	Indoor Air	IA-1C	344055-IA-1C										1
Building	Soil Vapor	SV-1C	344055-SV-1C										1
Building	Indoor Air	IA-2A	344055-IA-2A										1
Building	Soil Vapor	SV-2A	344055-SV-2A										1
Building	Indoor Air	IA-4A	344055-IA-4A										1
Building	Soil Vapor	SV-4A	344055-SV-4A										1
Building	Indoor Air	IA-4B	344055-IA-4B										1
Building	Soil Vapor	SV-4B	344055-SV-4B										1
Building	Indoor Air	IA-4C	344055-IA-4C										1
Building	Soil Vapor	SV-4C	344055-SV-4C										1
Building	Indoor Air	IA-5A	344055-IA-5A										1
Building	Soil Vapor	SV-5A	344055-SV-5A										1
Building	Indoor Air	IA-6A	344055-IA-6A										1
Building	Soil Vapor	SV-6A	344055-SV-6A										1
Building	Indoor Air	IA-7A to IA18A	344055-IA-XX										12
Building	Soil Vapor	SV7A to SV-18A	344055-SV-XX										12
Building	Indoor Air	Duplicates	TBD										2
Building	Soil Vapor	Duplicates	TBD										2
Building	Ambient Air	OA-sample date-01	344055 OA-sample date-01										5

Prepared By: JWP
Checked By: CRS

Table 3.2: Proposed Sample Identification and Analyses

				Water Samples				Soil/Sediment/Samples					Air Samples
Site Type	**Media**	**Site ID**	**Sample ID**	**VOCs**	**SVOCs**	**Pest PCBs**	**TAL Metals**	**VOCs**	**SVOCS**	**Pest PCBs**	**TAL Metals**	**TOC**	**VOCs (TO-15)**
Surface Water/Sediment													
Catch Basin	Surface Water	SW-1	344055-SW-01	1	1	1	1						
Catch Basin	Sediment	SD-1	344055-SD-01					1	1	1	1	1	
Catch Basin	Surface Water	SW-2	344055-SW-02	1	1	1	1						
Catch Basin	Sediment	SD-2	344055-SD-02					1	1	1	1	1	
Catch Basin	Surface Water	SW-3	344055-SW-03	1	1	1	1						
Catch Basin	Sediment	SD-3	344055-SD-03					1	1	1	1	1	
Catch Basin	Surface Water	SW-4	344055-SW-04	1	1	1	1						
Catch Basin	Sediment	SD-4	344055-SD-04					1	1	1	1	1	
Stream	Surface Water	SW-5	344055-SW-05	1	1	1	1						
Stream	Sediment	SD-5	344055-SD-05					1	1	1	1	1	
Stream	Surface Water	SW-6	344055-SW-06	1	1	1	1						
Stream	Sediment	SD-6	344055-SD-06					1	1	1	1	1	
Catch Basin	Surface Water	Trip Blanks	TBD	1									
Catch Basin	Surface Water	Duplicates	TBD	1	1	1	1						
Catch Basin	Sediment	Duplicates	TBD					1	1	1	1	1	
Building Sump	Surface Water	SW-7 to SW-18	344055-SW-07 to SW-18	12									
Building Sump	Surface Water	Duplicates	TBD	1									
Building Sump	Surface Water	Trip Blanks	TBD	1									
Building Sump	Surface Water	MS/MSD	TBD	1									
Hand Borings													
Background	Soil	HA-BK1	344055BSBK1___01XX								1		
Background	Soil	HA-BK2	344055BSBK2___01XX								1		
Background	Soil	HA-BK3	344055BSBK3___01XX								1		
Background	Soil	HA-BK4	344055BSBK4___01XX								1		
Background	Soil	HA-BK5	344055BSBK5___01XX								1		
Well Soil Borings													
Boring	Soil	BS-01(MW01)	344055BS001___01XX					1	1	1	1		
Boring	Soil	BS-02(MW02)	344055BS002___01XX					1	1	1	1		
Boring	Soil	BS-03(MW03)	344055BS003___01XX					1	1		1		
Boring	Soil	BS-04(MW04)	344055BS004___01XX					1	1	1	1		
Boring	Soil	BS-05(MW05)	344055BS005___01XX					1	1	1	1		
Boring	Soil	BS-06(MW06)	344055BS006___01XX					1	1		1		
Boring	Soil	BS-07(MW07)	344055BS007___01XX					1	1		1		
Boring	Soil	Trip Blanks	TBD					3					
Boring	Soil	Duplicates	TBD					1	1	1	1		
Boring	Soil	Rinseate	TBD					1	1	1	1		
Boring	Soil	MS/MSD	TBD					1	1	1	1		

Prepared By: JWP
Checked By: CRS

Table 3.2: Proposed Sample Identification and Analyses

				Water Samples				Soil/Sediment/Samples					Air Samples
Site Type	**Media**	**Site ID**	**Sample ID**	**VOCs**	**SVOCs**	**Pest PCBs**	**TAL Metals**	**VOCs**	**SVOCS**	**Pest PCBs**	**TAL Metals**	**TOC**	**VOCs (TO-15)**
Well Sampling													
Well	Groundwater	MW-GW-PW	344055GW-PW___01XX	4									
Well	Groundwater	MW-GW-PW	344055GW-PW___01XX	1	1	1	1						
Well	Groundwater	MW-GW-PW	344055GW-PW___01XX	1	1	1	1						
Well	Groundwater	MW-01	344055MW001___01XX	1	1	1	1						
Well	Groundwater	MW-02	344055MW002___01XX	1	1	1	1						
Well	Groundwater	MW-03	344055MW003___01XX	1	1		1						
Well	Groundwater	MW-04	344055MW004___01XX	1	1	1	1						
Well	Groundwater	MW-05	344055MW005___01XX	1	1	1	1						
Well	Groundwater	MW-06	344055MW006___01XX	1	1		1						
Well	Groundwater	MW-07	344055MW007___01XX	1	1		1						
Well	Groundwater	MW-03B	344055MW03B___01XX	1	1		1						
Well	Groundwater	MW-04B	344055MW04B___01XX	1	1	1	1						
Well	Groundwater	MW-05B	344055MW05B___01XX	1	1	1	1						
Well	Groundwater	MW-06B	344055MW06B___01XX	1	1		1						
Well	Groundwater	MW-07B	344055MW07B___01XX	1	1		1						
Well	Groundwater	Trip Blanks	TBD	6									
Well	Groundwater	Duplicates	TBD	2	1	1	1						
Well	Groundwater	Rinseate	TBD	1	1	1	1						
Well	Groundwater	MS/MSD	TBD	1	1	1	1						
TOTAL SAMPLES				51	24	18	24	20	17	14	22	7	63

NOTES:
Sample ID: __ represents the 3 digit sample depth below ground surface be determined in field
VOCs = Target Compound List Volatile Organic Compounds analyzed by USEPA SW-846 method 8260 for soil and water.
SVOCs = Semi-Volatile Organic Compounds analyzed by USEPA SW-846 method 8270.
Pest/PCBs = pesticides and polychlorinated biphenyls analyzed by USEPA SW-846 method 8081 and8082.
TAL metals = Target Analyte List metals analyzed by USEPA SW-846 methods 6010/7470.
Field Quality Control samples (duplicates, matrix spike, matrix spiked duplicates) will be collected at a frequency of 5% (1:20 samples).
TBD = To Be Determined

Prepared By: JWP
Checked By: CRS

APPENDIX A

SITE SPECIFIC QUALITY ASSURANCE PROJECT PLAN (QAPjP)

QUALITY ASSURANCE PROJECT PLAN
BRAM MANUFACTURING SITE

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

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

1.0 GENERAL PROCEDURES AND PRACTICES

The general procedures used to conduct the Site Characterization at the Bram Manufacturing site will be taken from the following sections of the QAPP:

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

2.0 FIELD PROCEDURES AND SAMPLING

The following field investigation techniques and procedures set forth in the QAPP will be used at the site:

QA/QC Procedures	Section 3.0
Decontamination	Subsection 4.3
Sample Handling	Subsections 4.5 and 5.0
Exploratory Drilling	Subsection 4.4.3
General Water Sampling Methodology	Subsection 4.5.4
Pore Water Sampling	Subsection 4.5.4.2
Low Flow Groundwater Sampling	Subsection 4.5.4.3
General Substructure Soil Vapor Sampling Methodology	Subsection 4.5.6
Indoor Air Sampling	Subsection 4.5.7
Ambient Air Sampling	Subsection 4.5.8
Global Positioning Surveys	Subsection 4.8.2
Field Instrument Calibration	Section 6.0

The following variances to the above procedures are described in subsections 2.1 to 2.5.

2.1 INVESTIGATION DERIVED WASTE

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

Drill soil cuttings will be screened for VOCs with a PID. Soils with visual evidence of contamination or with PID readings greater than 5 ppm will be containerized in USDOT approved 55-gallon containers for off-site disposal. Soils with sustained PID readings of less than or equal to 5 ppm will be considered non-contaminated and will be used as backfill for the borings at the

approximate interval from which they were extracted. Remaining uncontaminated soils will be spread evenly on the ground surface in unpaved areas, as agreed upon with the property owner and the NYSDEC.

Off-site transport and disposal of RI-generated wastes (hazardous and non-hazardous) will be the responsibility of MACTEC.

2.2 SAMPLING AND ANALYSIS PROGRAM

Data Quality Objectives (DQOs) for Bram Manufacturing site sampling activities are summarized in Table A-1. DQOs are described in accordance with USEPA guidelines (USEPA, 1987) and the NYSDEC Analytical Services Protocols (ASP) (NYSDEC, 2005).

Analytical data requirements were established using the methods described in the ASP. Analytical methods to be used for laboratory analysis are presented in Table A-2. Analytical Level B deliverables as described in the ASP will be provided by the laboratory. Data Usability Summary Report (DUSR) will be issued based on DEC guidelines (NYSDEC, 2002).

2.3 SAMPLING IDENTIFICATION

Sample identification is outlined in the Work Plan Table 3.2 and varies from Subsection 4.1 of the QAPP. The Sample ID starts with the Site ID 344055. After the site ID, the next digits represent the sample type, as outlined below:

Sample Type will include the following identifications:

IA – Indoor Air Sample (A/B/C designate different samples in same structure)

MW – Groundwater Monitoring Well Sample

OA – Ambient Air Sample

SV – Sub Slab Soil Vapor Sample (A/B/C if multiple locations in same structure)

SW – Surface Water Sample

SD – Sediment Sample

BS – Soil Boring Sample

HA – Hand Auger Soil Sample

For sub-slab vapor and indoor air samples, identifications follow the protocols noted below.

Sample Labeling Nomenclature

Sample Type	Nomenclature Sequence	Example ID	Notes
Sub-Slab Vapor	DEC ID# - SS-House ID	344055 SS-1	A/B/C if multiple samples
Indoor Air	DEC ID# - IA-House ID	344055 IA-1	A/B/C if multiple samples
Outdoor (Ambient) Air	DEC ID# - OA – Sample Date - 01	344055-OA-100707-01	Note: 01 = Number of OA samples collected on that date

2.4 DRUM LABELING

Drums 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.

Upon completion of the project, the NYSDEC Project Manager will be notified in writing about the location, number, and any relevant information regarding drums staged on the site. Drums are to be stored on wooden pallets. Drums shall be staged as directed by the NYSDEC. Final off-site transport and disposal of SC-generated wastes will be the responsibility of MACTEC.

REFERENCE

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

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

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

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

Table A-1:

Analytical DQO Levels

Parameter	Use	Data Quality Level
PH Temperature Specific Conductance Turbidity	Provides physical and chemical data on groundwater samples for use during sampling collection.	Level I
PID screening	Provides qualitative real-time information on air quality in the breathing zone for health and safety decisions, and to identify potentially contaminated groundwater, soil, and soil gas.	Level I
TCL VOCs, SVOCs, Inorganics, and pesticides/PCB	Provides analytical information to compare to standards and guidance values.	Level III

Notes:

TCL = target compound list

VOCs = volatile organic compounds

SVOCs = semi-volatile organic compounds

PCB = polychlorinated biphenyls

Table A-2:

Summary of Analytical Methods

Media	Parameter	Method
Groundwater, soil, surface waster and sediment	TCL VOCS, SVOCS, Metals, and pesticides/PCB	8260B, 8270C, 6010B/7470A/, 8081 and 8082, using NYSDEC ASP 2005.
Soil vapor/indoor air	TCL VOCS	USEPA Method TO-15
Sediment	TOC	USEPA Method 415.1

Notes:

TCL = target compound list

VOCs = volatile organic compounds

SVOCs = semi volatile organic compounds

PCB = polychlorinated biphenyls

APPENDIX A-1

CON-TEST ANALYTICAL REPORTING LIMITS

TO-15 RLs and MDLs

05/16/06

Con-Test
ANALYTICAL LABORATORY
39 SPRUCE ST
E. LONGMEADOW, MA 01028

TO-14 / TO-15		Low*	Low*	Low*	Low*
5/16/2006		RL	RL	MDL	MDL
heptane		0.1	0.4	0.03	0.14
mibk		0.1	0.4	0.05	0.22
1,3-dichloropropene (cis)		0.1	0.5	0.04	0.19
1,3-dichloropropene (trans)		0.1	0.5	0.06	0.27
1,1,2-trichloroethane		0.1	0.5	0.07	0.35
toluene		0.1	0.4	0.03	0.12
2-hexanone		0.1	0.4	0.03	0.11
dibromochloromethane		0.1	0.9	0.03	0.29
1,2-dibromoethane		0.1	0.8	0.03	0.20
tetrachloroethene		0.1	0.7	0.07	0.47
chlorobenzene		0.1	0.5	0.03	0.14
ethylbenzene		0.1	0.4	0.03	0.11
m/p xylene		0.1	0.4	0.06	0.26
bromoform		0.1	0.7	0.04	0.31
styrene		0.1	0.4	0.03	0.11
o-xylene		0.1	0.4	0.03	0.11
1,1,2,2-tetrachloroethane		0.1	0.7	0.03	0.23
4-ethyltoluene		0.1	0.5	0.03	0.13
1,3,5-trimethylbenzene		0.1	0.5	0.03	0.13
1,2,4-trimethylbenzene		0.1	0.5	0.03	0.13
1,3-dichlorobenzene		0.1	0.6	0.03	0.20
benzyl chloride		0.1	0.5	0.02	0.09
1,4-dichlorobenzene		0.1	0.6	0.03	0.17
1,2-dichlorobenzene		0.1	0.6	0.05	0.28
1,2,4-trichlorobenzene		0.1	0.7	0.04	0.30
hexachlorobutadiene		0.1	1.1	0.01	0.15
Upon request:					
Napthaalene					
Cumene					
1,4 Dioxane					
Acrylonitrile					
Methyl Acetate					
2,2,4 Trimethyjpentane					
Methylcyclohexane					
1,1,2 Tetrachloroethane					
Propylbenzene					

TO-15 RLs and MDLs

05/16/06

Analyte		PPBv	UG/M3	PPBv	UG/M3
TO-14 / TO-15		Low*	Low*	Low*	Low*
5/16/2006		RL	RL	MDL	MDL
propene		0.1	0.2	0.04	0.07
dichlorodifluoromethane		0.1	0.5	0.07	0.36
chloromethane		0.1	0.2	0.05	0.10
freon 114		0.1	0.7	0.06	0.42
vinyl chloride		0.1	0.3	0.04	0.11
1,3-butadienen		0.1	0.2	0.09	0.19
bromomethane		0.1	0.4	0.03	0.10
chloroethane		0.2	0.5	0.11	0.28
acetone		0.1	0.2	0.09	0.20
trichlorofluoromethane		0.1	0.6	0.04	0.21
ethanol		0.2	0.4	0.15	0.29
1,1-dichloroethene		0.1	0.4	0.05	0.20
methylene chloride		0.1	0.3	0.06	0.21
freon 113		0.1	0.8	0.04	0.32
carbon disulfide		0.1	0.3	0.03	0.08
trans-1,2-dichloroethene		0.1	0.4	0.05	0.21
1,1-dichloroethane		0.1	0.4	0.08	0.33
mtbe		0.1	0.4	0.07	0.23
ipa		0.1	0.2	0.04	0.09
2-butanone		0.1	0.3	0.05	0.14
cis-1,2-dichloroethene		0.1	0.4	0.03	0.12
vinyl acetate		0.1	0.4	0.05	0.17
hexane		0.1	0.4	0.06	0.23
ethyl acetate		0.2	0.7	0.12	0.44
chloroform		0.1	0.5	0.03	0.17
tetrahydrofuran		0.2	0.6	0.13	0.39
1,2-dichloroethane		0.1	0.4	0.04	0.17
1,1,1-trichloroethane		0.1	0.5	0.03	0.14
benzene		0.1	0.3	0.04	0.13
carbon tetrachloride		0.1	0.6	0.04	0.23
cyclohexane		0.1	0.3	0.04	0.15
1,2-dichloropropane		0.1	0.5	0.04	0.19
bromodichloromethane		0.1	0.7	0.03	0.21
trichloroethene		0.1	0.5	0.04	0.19
Analyte		PPBv	UG/M3	PPBv	UG/M3

Tert-Butylbenzene																
Sec-Butylbenzene																
P-Cymene																
Indane																
Butylbenzene																
1,2-Dibromo-3-Chloropropane																
Hexylcyclohexane																
2- Methylnaphthalene																
1- Methylnaphthalene																
* A .25ug/m3 is achieveable by TO 15 low curve, and/ or by SIM																
Low reporting limits are subject to sample matrix problems. Matrix interference's may cause limits to be elevated.																
Trace reporting limits are subject to sample matrix problems. Matrix interference's may cause limits to be elevated.																
Reporting Limit, lowest point in the calibration curve. Please note that the lowest point in the Low and Trace RL's																

* Note: Per phone conversation with Con-Test 6/8/2007 between Amanda Zeidler (MACTEC) and Tim Kelley note on field COC "0.25 ug/m³ RL required for TCE, PCE"

APPENDIX A-2

MITKEM ANALYTICAL REPORTING LIMITS

VOA Soil

&Analyte	MDL (ug/Kg)	PQL (ug/Kg)
1,1,1,2-Tetrachloroethane	0.38	5
1,1,1-Trichloroethane	0.42	5
1,1,2,2-Tetrachloroethane	0.57	5
1,1,2-Trichloroethane	0.49	5
1,1-Dichloroethane	0.33	5
1,1-Dichloroethene	0.92	5
1,1-Dichloropropene	0.65	5
1,2,3-Trichlorobenzene	0.42	5
1,2,3-Trichloropropane	0.89	5
1,2,4-Trichlorobenzene	0.25	5
1,2,4-Trimethylbenzene	0.33	5
1,2-Dibromo-3-chloropropane	0.67	5
1,2-Dibromoethane	0.36	5
1,2-Dichlorobenzene	0.44	5
1,2-Dichloroethane	0.36	5
1,2-Dichloropropane	0.29	5
1,3,5-Trimethylbenzene	0.3	5
1,3-Dichlorobenzene	0.3	5
1,3-Dichloropropane	0.4	5
1,4-Dichlorobenzene	0.25	5
2,2-Dichloropropane	0.33	5
2-Butanone	1.3	5
2-Chlorotoluene	0.56	5
2-Hexanone	0.95	5
4-Chlorotoluene	0.24	5
4-Isopropyltoluene	0.22	5
4-Methyl-2-pentanone	0.85	5
Acetone	1.5	5
Benzene	0.33	5
Bromobenzene	0.29	5
Bromochloromethane	0.76	5
Bromodichloromethane	0.27	5
Bromoform	0.57	5
Bromomethane	0.97	5
Carbon disulfide	0.27	5
Carbon tetrachloride	0.3	5
Chlorobenzene	0.47	5
Chloroethane	0.8	5
Chloroform	0.29	5
Chloromethane	0.86	5
cis-1,2-Dichloroethene	0.71	5
cis-1,3-Dichloropropene	0.32	5
Dibromochloromethane	0.28	5
Dibromomethane	0.48	5
Dichlorodifluoromethane	0.48	5
Ethylbenzene	0.39	5
Hexachlorobutadiene	0.61	5
Iodomethane	0.26	5
Isopropylbenzene	0.29	5
m,p-Xylene	0.8	5
Methyl tert-butyl ether	0.75	5
Methylene chloride	0.75	5
n-Butylbenzene	0.27	5
n-Propylbenzene	0.44	5
Naphthalene	0.36	5
o-Xylene	0.44	5

VOA Aqueous

&Analyte	MDL (ug/L)	PQL (ug/L)
1,1,1,2-Tetrachloroethane	0.45	5
1,1,1-Trichloroethane	0.41	5
1,1,2,2-Tetrachloroethane	0.39	5
1,1,2-Trichloroethane	0.51	5
1,1-Dichloroethane	0.4	5
1,1-Dichloroethene	0.57	5
1,1-Dichloropropene	0.73	5
1,2,3-Trichlorobenzene	0.5	5
1,2,3-Trichloropropane	0.84	5
1,2,4-Trichlorobenzene	0.49	5
1,2,4-Trimethylbenzene	0.42	5
1,2-Dibromo-3-chloropropane	0.72	5
1,2-Dibromoethane	0.3	5
1,2-Dichlorobenzene	0.39	5
1,2-Dichloroethane	0.33	5
1,2-Dichloropropane	0.72	5
1,3,5-Trimethylbenzene	0.31	5
1,3-Dichlorobenzene	0.36	5
1,3-Dichloropropane	0.6	5
1,4-Dichlorobenzene	0.37	5
2,2-Dichloropropane	0.35	5
2-Butanone	1.9	5
2-Chlorotoluene	0.53	5
2-Hexanone	1.7	5
4-Chlorotoluene	0.71	5
4-Isopropyltoluene	0.46	5
4-Methyl-2-pentanone	2.9	5
Acetone	4.6	5
Benzene	0.39	5
Bromobenzene	0.35	5
Bromochloromethane	0.35	5
Bromodichloromethane	0.43	5
Bromoform	0.27	5
Bromomethane	0.77	5
Carbon disulfide	0.25	5
Carbon tetrachloride	0.37	5
Chlorobenzene	0.32	5
Chloroethane	0.75	5
Chloroform	0.4	5
Chloromethane	0.44	5
cis-1,2-Dichloroethene	0.59	5
cis-1,3-Dichloropropene	0.46	5
Dibromochloromethane	0.33	5
Dibromomethane	0.76	5
Dichlorodifluoromethane	0.77	5
Ethylbenzene	0.33	5
Hexachlorobutadiene	0.84	5
Iodomethane	0.46	5
Isopropylbenzene	0.27	5
m,p-Xylene	0.92	5
Methyl tert-butyl ether	0.43	5
Methylene chloride	0.44	5
n-Butylbenzene	0.49	5
n-Propylbenzene	0.27	5
Naphthalene	0.46	5
o-Xylene	0.45	5

sec-Butylbenzene	0.27	5
Styrene	0.28	5
tert-Butylbenzene	0.29	5
Tetrachloroethene	0.39	5
Toluene	0.55	5
trans-1,2-Dichloroethene	0.57	5
trans-1,3-Dichloropropene	0.26	5
Trichloroethene	0.35	5
Trichlorofluoromethane	0.27	5
Vinyl acetate	0.5	5
Vinyl chloride	0.43	5
Xylene (Total)	1.1	5

sec-Butylbenzene	0.33	5
Styrene	0.48	5
tert-Butylbenzene	0.46	5
Tetrachloroethene	0.46	5
Toluene	0.71	5
trans-1,2-Dichloroethene	0.44	5
trans-1,3-Dichloropropene	0.66	5
Trichloroethene	0.76	5
Trichlorofluoromethane	0.84	5
Vinyl acetate	0.46	5
Vinyl chloride	0.44	5
Xylene (Total)	1.3	5

SVOA Soil

&Analyte	MDL (ug/Kg)	PQL (ug/Kg)
1,2,4-Trichlorobenzene	69	330
1,2-Dichlorobenzene	69	330
1,3-Dichlorobenzene	66	330
1,4-Dichlorobenzene	68	330
2,2´-oxybis(1-Chloropropane)	68	330
2,4,5-Trichlorophenol	62	670
2,4,6-Trichlorophenol	74	330
2,4-Dichlorophenol	70	330
2,4-Dimethylphenol	37	330
2,4-Dinitrophenol	180	670
2,4-Dinitrotoluene	90	330
2,6-Dinitrotoluene	91	330
2-Chloronaphthalene	74	330
2-Chlorophenol	67	330
2-Methylnaphthalene	65	330
2-Methylphenol	59	330
2-Nitroaniline	74	670
2-Nitrophenol	82	330
3,3´-Dichlorobenzidine	75	330
3-Nitroaniline	77	670
4,6-Dinitro-2-methylphenol	62	670
4-Bromophenyl-phenylether	88	330
4-Chloro-3-methylphenol	78	330
4-Chloroaniline	39	330
4-Chlorophenyl-phenylether	75	330
4-Methylphenol	72	330
4-Nitroaniline	79	670
4-Nitrophenol	340	670
Acenaphthene	75	330
Acenaphthylene	76	330
Anthracene	86	330
Benzo(a)anthracene	87	330
Benzo(a)pyrene	85	330
Benzo(b)fluoranthene	87	330
Benzo(g,h,i)perylene	79	330
Benzo(k)fluoranthene	95	330
Bis(2-chloroethoxy)methane	69	330
Bis(2-chloroethyl)ether	70	330
Bis(2-ethylhexyl)phthalate	100	330
Butylbenzylphthalate	91	330
Carbazole	94	330
Chrysene	88	330
Di-n-butylphthalate	99	330
Di-n-octylphthalate	99	330
Dibenzo(a,h)anthracene	86	330
Dibenzofuran	75	330
Diethylphthalate	82	330
Dimethylphthalate	81	330
Fluoranthene	85	330
Fluorene	80	330
Hexachlorobenzene	86	330
Hexachlorobutadiene	64	330
Hexachlorocyclopentadiene	60	330
Hexachloroethane	66	330
Indeno(1,2,3-cd)pyrene	87	330
Isophorone	67	330
N-Nitroso-di-n-propylamine	60	330
N-Nitrosodiphenylamine	86	330
Naphthalene	68	330
Nitrobenzene	60	330

SVOA Aqueous

&Analyte	MDL (ug/L)	PQL (ug/L)
1,2,4-Trichlorobenzene	0.81	10
1,2-Dichlorobenzene	0.66	10
1,3-Dichlorobenzene	0.66	10
1,4-Dichlorobenzene	0.63	10
2,2´-oxybis(1-Chloropropane)	0.99	10
2,4,5-Trichlorophenol	0.76	20
2,4,6-Trichlorophenol	0.91	10
2,4-Dichlorophenol	0.98	10
2,4-Dimethylphenol	3	10
2,4-Dinitrophenol	3.6	20
2,4-Dinitrotoluene	1.1	10
2,6-Dinitrotoluene	1	10
2-Chloronaphthalene	0.89	10
2-Chlorophenol	0.71	10
2-Methylnaphthalene	0.83	10
2-Methylphenol	1.2	10
2-Nitroaniline	0.72	20
2-Nitrophenol	1.1	10
3,3´-Dichlorobenzidine	0.84	10
3-Nitroaniline	0.93	20
4,6-Dinitro-2-methylphenol	1.2	20
4-Bromophenyl-phenylether	1.1	10
4-Chloro-3-methylphenol	0.92	10
4-Chloroaniline	0.57	10
4-Chlorophenyl-phenylether	0.74	10
4-Methylphenol	1.1	10
4-Nitroaniline	1.1	20
4-Nitrophenol	0.9	20
Acenaphthene	0.83	10
Acenaphthylene	0.7	10
Anthracene	0.94	10
Benzo(a)anthracene	0.93	10
Benzo(a)pyrene	0.97	10
Benzo(b)fluoranthene	1.5	10
Benzo(g,h,i)perylene	0.85	10
Benzo(k)fluoranthene	1.1	10
Bis(2-chloroethoxy)methane	0.75	10
Bis(2-chloroethyl)ether	0.86	10
Bis(2-ethylhexyl)phthalate	2.5	10
Butylbenzylphthalate	1	10
Carbazole	1	10
Chrysene	1.1	10
Di-n-butylphthalate	0.92	10
Di-n-octylphthalate	1	10
Dibenzo(a,h)anthracene	1.1	10
Dibenzofuran	0.72	10
Diethylphthalate	1	10
Dimethylphthalate	0.78	10
Fluoranthene	1	10
Fluorene	0.84	10
Hexachlorobenzene	0.96	10
Hexachlorobutadiene	0.7	10
Hexachlorocyclopentadiene	0.85	10
Hexachloroethane	0.73	10
Indeno(1,2,3-cd)pyrene	1.1	10
Isophorone	0.74	10
N-Nitroso-di-n-propylamine	0.84	10
N-Nitrosodiphenylamine	0.85	10
Naphthalene	0.67	10
Nitrobenzene	0.9	10

Pentachlorophenol	18	670
Phenanthrene	90	330
Phenol	60	330
Pyrene	88	330

Pentachlorophenol	0.72	20
Phenanthrene	1	10
Phenol	0.74	10
Pyrene	0.89	10

Pest Soil

&Analyte	MDL (ug/Kg)	PQL (ug/Kg)
4,4´-DDD	1.3	3.3
4,4´-DDE	0.29	3.3
4,4´-DDT	0.27	3.3
Aldrin	0.11	1.7
alpha-BHC	0.11	1.7
alpha-Chlordane	0.47	1.7
beta-BHC	0.15	1.7
delta-BHC	0.13	1.7
Dieldrin	0.46	3.3
Endosulfan I	0.22	1.7
Endosulfan II	0.8	3.3
Endosulfan sulfate	0.24	3.3
Endrin	0.32	3.3
Endrin aldehyde	0.16	3.3
Endrin ketone	0.15	3.3
gamma-BHC (Lindane)	0.15	1.7
gamma-Chlordane	0.39	1.7
Heptachlor	0.17	1.7
Heptachlor epoxide	0.16	1.7
Methoxychlor	0.87	17
Toxaphene	20	170

Pest Aqueous

&Analyte	MDL (ug/L)	PQL (ug/L)
4,4´-DDD	0.015	0.1
4,4´-DDE	0.016	0.1
4,4´-DDT	0.016	0.1
Aldrin	0.0067	0.05
alpha-BHC	0.0091	0.05
alpha-Chlordane	0.0083	0.05
beta-BHC	0.008	0.05
delta-BHC	0.0063	0.05
Dieldrin	0.016	0.1
Endosulfan I	0.0075	0.05
Endosulfan II	0.021	0.1
Endosulfan sulfate	0.018	0.1
Endrin	0.018	0.1
Endrin aldehyde	0.019	0.1
Endrin ketone	0.016	0.1
gamma-BHC (Lindane)	0.0068	0.05
gamma-Chlordane	0.0081	0.05
Heptachlor	0.007	0.05
Heptachlor epoxide	0.0079	0.05
Methoxychlor	0.13	0.5
Toxaphene	0.41	5

&Analyte	MDL (ug/Kg)	PQL (ug/Kg)
Aroclor-1016	3.7	33
Aroclor-1221	2.7	33
Aroclor-1232	1.6	33
Aroclor-1242	2.6	33
Aroclor-1248	1.3	33
Aroclor-1254	2.6	33
Aroclor-1260	3.5	33

AT	RO	&Analyte	MDL (ug/L)	PQL (ug/L)
A	22	Aroclor-1016	0.13	1
A	23	Aroclor-1221	0.2	1
A	24	Aroclor-1232	0.075	1
A	25	Aroclor-1242	0.079	1
A	26	Aroclor-1248	0.13	1
A	27	Aroclor-1254	0.17	1
A	28	Aroclor-1260	0.15	1

&Analyte	MDL (mg/Kg)	PQL (mg/Kg)
Aluminum	0.3	10
Antimony	0.15	1
Arsenic	0.14	1
Barium	0.1	10
Beryllium	0.0014	0.25
Cadmium	0.007	0.25
Calcium	7.4	40
Chromium	0.01	1
Cobalt	0.013	2.5
Copper	0.094	1.5
Iron	1.2	10
Lead	0.037	0.5
Magnesium	0.27	25
Manganese	0.17	2.5
Nickel	0.012	2.5
Potassium	1.5	50
Selenium	0.15	1.5
Silver	0.047	1.5
Sodium	1	50
Thallium	0.11	1
Vanadium	0.042	2.5
Zinc	0.052	2.5
Mercury	0.0053	0.033

&Analyte	MDL (ug/L)	PQL (ug/L)
Aluminum	37	200
Antimony	4.4	20
Arsenic	2.5	20
Barium	11	200
Beryllium	0.051	5
Cadmium	0.11	5
Calcium	99	800
Chromium	0.22	20
Cobalt	0.068	50
Copper	1.7	30
Iron	89	200
Lead	1.2	10
Magnesium	7.9	500
Manganese	1.8	50
Nickel	0.22	50
Potassium	36	1000
Selenium	5.2	30
Silver	1.2	30
Sodium	64	1000
Thallium	2.8	20
Vanadium	0.4	50
Zinc	3.3	50
Mercury	0.11	0.2

APPENDIX B

SITE SPECIFIC HEALTH AND SAFETY PLAN (HASP)

MACTEC, Inc.

MACTEC Short Form HASP

Site: Bram Manufacturing (Bram) Job Number: 3612082098
Street Address: 100 Pixley Industrial Parkway in the Town of Gates, Monroe County, New York
Proposed Date(s) of Investigation: May through November 2008
Prepared by: John Peterson Date: 3/26/2008
*Approved by: Kendra Bavor Date: 3/27/2008

Site Description: **(attach map)** The former Bram Manufacturing facility reportedly manufactured lighting fixtures. Bram reportedly used solvents (e.g., TCE, PCE) during the manufacturing process. Spills and/or disposal of solvents have resulted in groundwater contamination and the source of contamination is presumed to be under a newer portion of the building (east side). Adjacent to the site to the south and in a presumed upgradient location, three underground storage tanks (2 diesel, 1 unleaded gasoline) were removed. Contamination was present in association with the unleaded gasoline tank. This leak has resulted in fuel contamination in groundwater that is present in groundwater at the Site.

Proposed Activity(s): Bedrock and Overburdened Well Installation, Low-Flow Groundwater Sampling, Surface Water and Sediment Sampling, Soil Sampling, Borehole Geophysics, Sub Slab and Indoor Air Sampling, and a Survey.

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

Dates of Required Training and Medical Surveillance:

	Req?	Names of Field Team			
		Jerry Rawcliffe	Michael Washburn	Dates	Dates
Medical Surveillance					
Site Specific Medical Testing:_____					
40-Hour Initial		5/1/85-4/19/35	3/23/07-3/23/57		
8-Hour Supervisor [1, 3]		8/1/95-7/19/45			
8-Hour Refresher		5/14/07-5/13/08	Due		
First Aid [1,2]		11/15/05-11/14/08			
Respirator Protection[1]		5/14/07-5/13/08			
Respirator Brand [1]					
Hazard Communication [1]					
Fall Protection [1]					
Confined Space Entry [1]		5/3/04-4/21/54			
CPR [1,2]		1/30/07-1/30/08	9/17/05-9/17/07		

[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	PEL/TLV
1,2-dichloroethene 3100 in 1999&2003	200 ppm
Tetrachloroethene 300 in 2003	25 ppm
1,1,1-Trichloroethane 87 in 1998	350 ppm
cis-1,2-Dichloroethene 2600 in 1998	200 ppm
Trichloroethene 9500 in 2004	10 ppm
vinyl chloride 440 in 2004	1 ppm
n-Butylbenzene 25 in 1999	NA
tert-Butylbenzene 370 in 1999	NA
Ethylbenzene 210 in 1999	100 ppm
Isopropylbenzene 170 in 1999	50 ppm

p-isopopyltoluene 12 in 1999	NA
n-propylbenzene 270 in 1999	NA
1,2,4-trimethylbenzene 3200 in 1999	25 ppm
1,3,5-trimethylbenzene 1800 in 1999	25 ppm
o-Xylene 22 in 1999	100 ppm
p-&m-Xylene 91 in 1999	100 ppm
1,3-dichloropropane 510 in 1998	NA
Actetone 1700 in 2003	500 ppm TLV

NA = not available

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
☒	Drilling Operation (MACTEC Driller)
☐	Geoprobe (MACTEC Geoprobe Operator)
☐	Excavations and Backfilling
☒	Stream/Wetlands Work
☐	

Hazard Specific JHAs:

☒	Insect Stings and Bites
☐	Gasoline
☒	Working with Preservatives (Acids)
☒	Pore Water Sampling
☒	Well Development
☒	Power Tool Use - Electrical
☒	Sub-slab Indoor Air Sampling
☒	Working in Muddy Areas
☐	
☐	

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

Chemicals	MSDS Attached?
HYDROCHLORIC ACID, NITRIC ACID, SULFRIC ACID, SODIUM HYDROXIDE	☒
LIQUINOX/ALCONOX	☒
ISOBUTYLENE	☒
AUTO CAL COLUTION	☒

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
☒ None known

PPE and Monitoring Instruments

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

Standard PPE					
☒ Hard Hat	☒ Safety boots	☒ Safety glasses	☐ 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: __NA__	Change Cartridges: __NA___

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_____		

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: ☒ 10.6 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]	$_{1}$LEL[2]/O_2	Action	Level of PPE
Above background	>0.5 Vinyl Chloride or staining	N/A		Back off, cease work, re-evaluate situation. Contact Division EH&S Manager.	Level D
Background	N/A	Dust monitor respirable dust. Visual dust present - 2.5 mg/m^3		Move upwind. Implement dust control measures. If dust persists, cease work and consult H&S Officer.	Level D
5 ppm to 120 ppm	>0.5 Vinyl Chloride or staining	N/A		Upgrade to Level C	Level C

>120 ppm	>0.5 Vinyl Chloride or staining	N/A		Stop work, contact HSO	Level B
			>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.	
Air monitoring will also be performed in accordance with the NYSDOH Generic Community Air Monitoring Plan (CAMP), which is included in this HASP.					

[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		
Primary Hospital: Nyack Hospital	(845) 348-2345		
Secondary Hospital: Good Samaritan Hospital	(845) 368-5000		
Police Department:	911		
Site Health And Safety Officer: Jerry Rawcliffe	Office: 207-775-5401	Home: 207-807-7353	
Client Contact: NYSDEC – Randy Whitcher	Office: 518-402-9662	Pager:	
Project Manager: John Peterson	Office: 207-775-5401	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		
Health Resources	800-350-4511		

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

- ☒ Field First Aid Kit
- ☒ Fire Extinguisher (ABC type)
- ☐ 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 Emergency Procedures are as follows:

Refer to project HASP for MACTEC Program information such as Required Training, Medical monitoring, Investigative Derived Waste disposal and Decontamination procedures.

Decontamination and Investigative Derived Waste shall be handled as documented in the work plan.

Perimeter air monitoring with total dust meter – real time readings. Any visual dust – implement dust suppression methods.

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: Nyack Hospital
Address: 160 N Midland Ave
Telephone Number (845) 348-2345

DIRECTIONS TO PRIMARY HOSPITAL (attach map):

See map

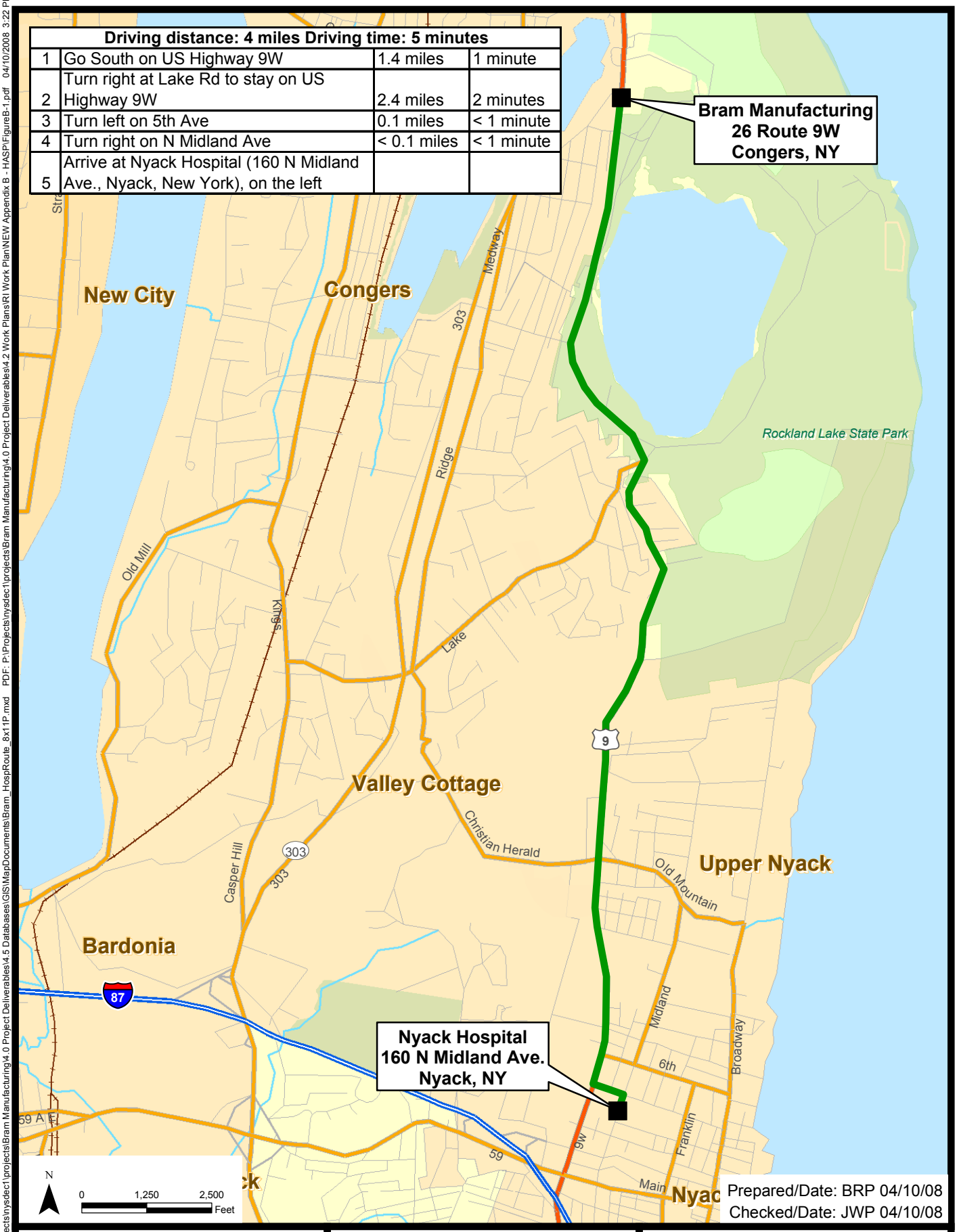
ALTERNATE HOSPITAL:

Facility Name: Good Samaritan Hospital
Address: 255 Lafayette Ave.
Telephone Number Suffern, NY 10901

DIRECTIONS TO ALTERNATE HOSPITAL (attach map):

See map

Driving distance: 4 miles Driving time: 5 minutes			
1	Go South on US Highway 9W	1.4 miles	1 minute
2	Turn right at Lake Rd to stay on US Highway 9W	2.4 miles	2 minutes
3	Turn left on 5th Ave	0.1 miles	< 1 minute
4	Turn right on N Midland Ave	< 0.1 miles	< 1 minute
5	Arrive at Nyack Hospital (160 N Midland Ave., Nyack, New York), on the left		



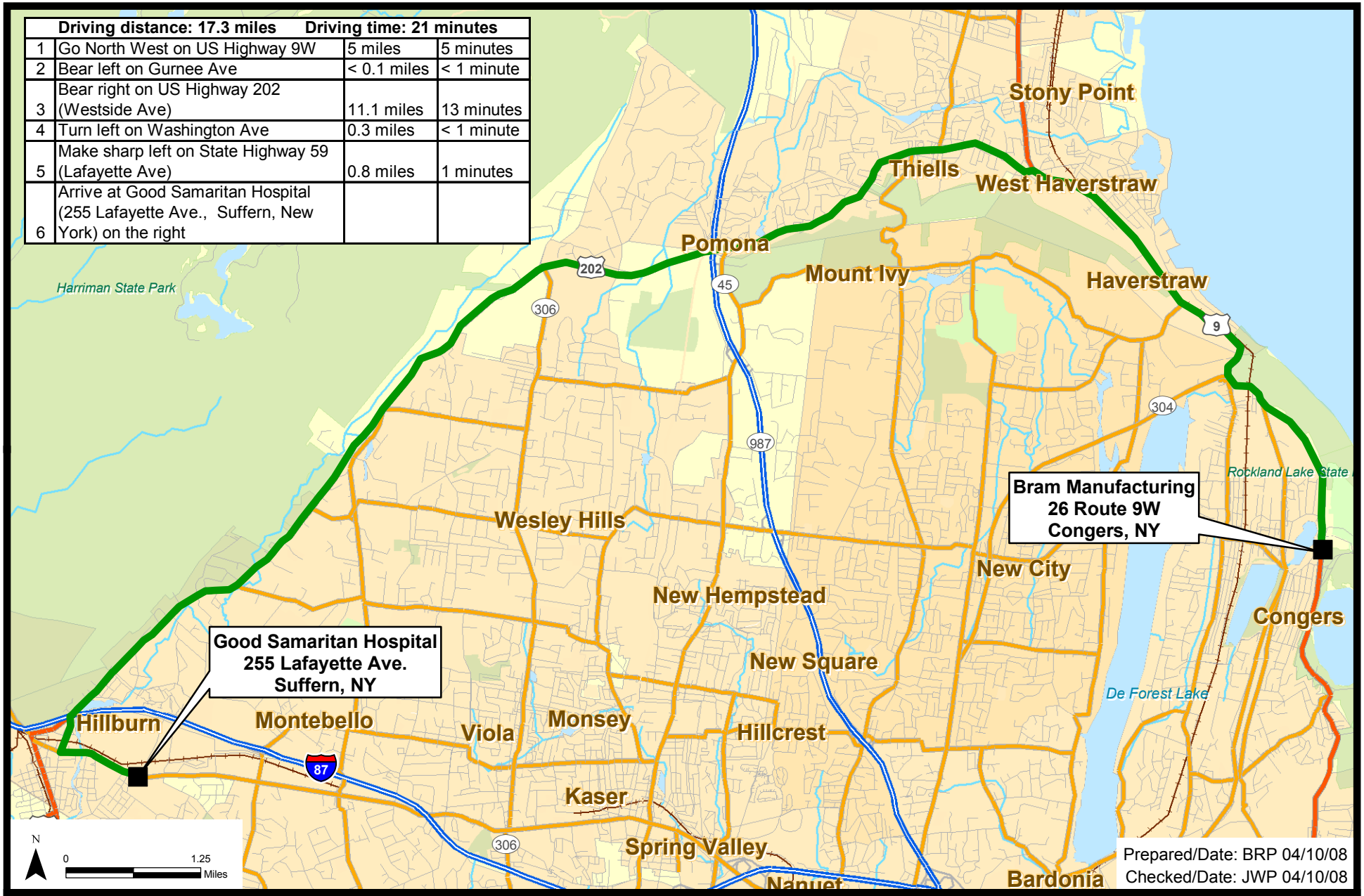
Prepared/Date: BRP 04/10/08
Checked/Date: JWP 04/10/08

RI/FS WORK PLAN
BRAM MANUFACTURING
CONGERS, NEW YORK

MACTEC

PRIMARY HOSPITAL ROUTE
NYACK HOSPITAL
Project 3612-08-2098
Figure B-1

	Driving distance: 17.3 miles	Driving time: 21 minutes	
1	Go North West on US Highway 9W	5 miles	5 minutes
2	Bear left on Gurnee Ave	< 0.1 miles	< 1 minute
3	Bear right on US Highway 202 (Westside Ave)	11.1 miles	13 minutes
4	Turn left on Washington Ave	0.3 miles	< 1 minute
5	Make sharp left on State Highway 59 (Lafayette Ave)	0.8 miles	1 minutes
6	Arrive at Good Samaritan Hospital (255 Lafayette Ave., Suffern, New York) on the right		



Prepared/Date: BRP 04/10/08
Checked/Date: JWP 04/10/08

RI/FS WORK PLAN
BRAM MANUFACTURING
CONGERS, NEW YORK

MACTEC

SECONDARY HOSPITAL ROUTE
GOOD SAMARITAN HOSPITAL
Project 3612-08-2098
Figure B-2

Document: P:\Projects\nysdec1\projects\Bram Manufacturing\4.0 Project Deliverables\4.5 Databases\GIS\MapDocuments\Bram_HospRoute2_8x11P.mxd PDF: P:\Projects\nysdec1\projects\Bram Manufacturing\4.0 Project Deliverables\4.2 Work Plans\RI Work Plan\NEW Appendix B - HASP\FigureB-2.pdf 04/10/2008 3:01 PM brpeters

HIGHEST CONCENTRATIONS OF PREVIOUSLY DETECTED COMPOUNDS
HEALTH AND SAFETY PLAN
BRAM MANUFACTURING, CONGERS, NEW YORK

Parameter	Groundwater Concentration (µg/L)	Year Detected	PELs/TLV	
Bram Site Contaminants				
Chlorinated Hydrocarbons				
1,2-dichloroethene	3100	1999/2003	200	ppm
tetrachloroethene	300	2003	25 / (100 ppm STEL)	ppm
1,1,1-Trichloroethane	87	1998	350 (450 ppm STEL)	ppm
cis-1,2-Dichloroethene	2600	1998	200	ppm
Trichloroethene	9500	2004	100	ppm
vinyl chloride	440	2004	1	ppm
Aromatic Hydrocarbons				
n-Butylbenzene	25	1999	NA	ppm
tert-Butylbenzene	370	1999	NA	ppm
Ethylbenzene	210	1999	100 (75 ppm STEL)	ppm
Isopropylbenzene	170	1999	50	ppm
p-isopopyltoluene	12	1999	NA	ppm
n-propylbenzene	270	1999	NA	ppm
1,2,4-trimethylbenzene	3200	1999	25	ppm
1,3,5-trimethylbenzene	1800	1999	25	ppm
o-Xylene	22	1999	100 (150 ppm STEL)	ppm
p-&m-Xylene	91	1999	100 (150 ppm STEL)	ppm
Other Compounds				
1,3-dichloropropane	510	1998	NA	ppm
actetone	1700	2003	500 / 250 - REL (750 ppm STEL)	ppm

Notes:

PELs/TLV = Permissible Exposure Limits/Threashold Limit Value
ppm = parts per million
ND = not detected
NA = none available

Created by: JWP
Checked by: CRS

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

P:\Bureau\Common\CommunityAirMonitoringPlan (CAMP)\GCAMPR1.DOC

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.

AutoCal -----MATERIAL SAFETY DATA SHEET-----

AutoCal Solution
Compliance Technology Inc.
118 Starlite St.
So. San Francisco, CA 94080-6310Prepared: February 20, 1996
Revised: February 14, 2000

----- NOTICE-----

This information is believed to be accurate and represents the best information currently available to us. however, we make no warranty of merchantability, or fitness for any particular use, or any other warranty, express or implied, with respect to this information, and we assume no liability resulting from the use of this information. Users should make their own investigations to determine the suitability of the information for their particular needs and purposes. Compliance Technology Inc. will assist in this regard.

-----SUBSTANCE IDENTIFICATION-----

SUBSTANCE: AutoCal Solution Calibrating Buffer Solution
Trade names/synonyms: This material is also known by various catalog numbers.
Cercla ratings (scale 0-3): health=0 fire=0 reactivity=0 persistence=0
Nfpa ratings (scale 0-4): health=0 fire=0 reactivity=0

-----COMPONENTS AND CONTAMINANTS---

Component: potassium hydrogen phthalate CAS# 877-24-7 Percent: <2.0
Component: water CAS# 7732-18-5 percent: >98
Other contaminants: none

----- EXPOSURE LIMITS-----

No occupational exposure limits established by osha, acgih or niosh.

-----PHYSICAL DATA-----

Description:
Clear, colorless liquid.
Approx. boiling point: 212°F (100°C). Approx. melting point: 32°F (0°C)
Vapor pressure: 14 torr @20°C Evap. Rate: (ether=1) < 1
pH: 4.0 Solubility in water: complete Vapor density: 0.7 (H2O)

-----FIRE AND EXPLOSION DATA-----

Fire and explosion hazard: No fire hazard when exposed to heat or flame.
Flash point: not applicable
Fire fighting media: dry chemical, carbon dioxide, water spray or regu-lar foam. (1990 emergency response guidebook, dot p-5800.5) For larger fires, use water spray, fog or regular foam. (1990 emergency response guidebook, dot p-5800.5)
Fire fighting: Move container from fire area if it can be done without risk. Do not scatter spilled material with high-pressure water streams. Dike fire-control water for later disposal . (1990 emergency response guidebook, dot p-5800.5 Pg. 31) Use agents suitable for the type of surrounding fire. Avoid breathing hazardous vapors, stay upwind of the fire.

-----TOXICITY-----

potassium hydrogen phthalate:
Carcinogen status: none.

Local effects: irritant - inhalation, skin, eye.
Acute toxicity level: no data available.
Target effects: no data available.
medical conditions agravated by exposure: no data available.

-----HEALTH EFFECTS AND FIRST AID-----
INHALATION
POTASSIUM HYDROGEN PHTHALATE:IRRITANT.
ACUTE EXPOSURE - MAY CAUSE IRRITATION.
CHRONIC EXPOSURE - REPEATED OR PROLONGED EXPOSURE MAY CAUSE IRRITA-TION.
FIRST AID - REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.
SKIN CONTACT:
POTASSIUM HYDROGEN PHTHALATE:IRRITANT.
ACUTE EXPOSURE - MAY CAUSE IRRITATION.
CHRONIC EXPOSURE - REPEATED OR PROLONGED EXPOSURE MAY CAUSE DERMATITIS.
FIRST AID - REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY, WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.
EYE CONTACT:
POTASSIUM HYDROGEN PHTHALATE: IRRITANT.
ACUTE EXPOSURE-DIRECT CONTACT MAY CAUSE IRRITATION, REDNESS AND PAIN.
CRONIC EXPOSURE-REPEATED OR PROLONGED EXPOSURE MAY CAUSE CONJUNCTIVITIS
FIRST AID - WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE, OCCASIONALLY LIFTING UPPER AND LOWER LIDS UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.
INGESTION
POTASSIUM HYDROGEN PHTHALATE: IRRITANT.
ACUTE EXPOSURE - MAY CAUSE NAUSEA, VOMITING AND DIARRHEA.
CRONIC EXPOSURE - NOT REPORTED TO OCCUR IN HUMANS
FIRST AID - IF VICTIM IS CONSCIOUS, IMMEDIATELY GIVE 2-4 GLASSES OF WATER, AND INDUCE VOMITING BY TOUCHING FINGER TO BACK OF THROAT, GET MEDICAL ATTENTION IMMEDIATELY.

-----REACTIVITY-----
Reactivity: stable under normal temperatures and pressures.
Incompatibilities: AFFECTED BY STRONG OXIDIZERS WHEN DRY.
Decomposition: NONE KNOWN WHILE IN SOLUTION.
Polymerization: NONE KNOWN WHILE IN SOLUTION.

-----STORAGE AND DISPOSAL-----
Observe all federal, state and local regulations when storing or disposing of this substance. for assistance, contact the district director of the environmental protection agency.

-----PROTECTIVE EQUIPMENT-----
When using, wear eye protection to prevent contact.

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 ppm (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-UNITED 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, SINGAPORE, VIETNAM check ACGI TLV

Section 16 - Additional Information

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

AIR LIQUIDE

MATERIAL SAFETY DATA SHEET

Prepared to U.S. OSHA, CMA, ANSI and Canadian WHMIS Standards

1. PRODUCT IDENTIFICATION

CHEMICAL NAME; CLASS: NON-FLAMMABLE GAS MIXTURE

Containing One or More of the Following Components in a Nitrogen Balance Gas: Oxygen 0-23.5%; Isobutylene, 0.0005-0.9%

SYNONYMS: Not Applicable
CHEMICAL FAMILY NAME: Not Applicable
FORMULA: Not Applicable
Document Number: 50054

Note: The Material Safety Data Sheet is for this gas mixture supplied in cylinders with 33 cubic feet (935 liters) or less gas capacity (DOT - 39 cylinders). This MSDS has been developed for various gas mixtures with the composition of components within the ranges listed in Section 2 (Composition and Information on Ingredients). Refer to the product label for information on the actual composition of the product.

PRODUCT USE:	Calibration of Monitoring and Research Equipment
SUPPLIER/MANUFACTURER'S NAME:	AIR LIQUIDE AMERICA CORPORATION
ADDRESS:	821 Chesapeake Drive Cambridge, MD 21613
EMERGENCY PHONE:	CHEMTREC: 1-800-424-9300
BUSINESS PHONE:	1-410-228-6400
General MSDS Information	1-713/868-0440
Fax on Demand:	1-800/231-1366

2. COMPOSITION and INFORMATION ON INGREDIENTS

CHEMICAL NAME	CAS #	mole %	EXPOSURE LIMITS IN AIR					
			ACGIH		OSHA			
			TLV ppm	STEL ppm	PEL ppm	STEL ppm	IDLH ppm	OTHER
Oxygen	7782-44-7	0 - 23.5%	There are no specific exposure limits for Oxygen.					
Isobutylene	115-11-7	0.0005 - 0.9%	There are no specific exposure limits for Isobutylene.					
Nitrogen	7727-37-9	Balance	There are no specific exposure limits for Nitrogen. Nitrogen is a simple asphyxiant (SA). Oxygen levels should be maintained above 19.5%.					

NE = Not Established. C = Ceiling Limit. See Section 16 for Definitions of Terms Used.

NOTE : All WHMIS required information is included. It is located in appropriate sections based on the ANSI Z400.1-1993 format.

3. HAZARD IDENTIFICATION

EMERGENCY OVERVIEW: This product is a colorless, odorless gas. Releases of this product may produce oxygen-deficient atmospheres (especially in confined spaces or other poorly-ventilated environments); individuals in such atmospheres may be asphyxiated. Isobutylene, a component of this gas mixture, may cause drowsiness and other central nervous system effects in high concentrations; however, due to its low concentration in this gas mixture, this is unlikely to occur.

SYMPTOMS OF OVER-EXPOSURE BY ROUTE OF EXPOSURE: The most significant route of over-exposure for this product is by inhalation.

INHALATION: Due to the small size of an individual cylinder of this product, no unusual health effects from over-exposure to the product are anticipated under routine circumstances of use. The chief health hazard associated with this gas mixture is when this product contains less than 19.5% Oxygen and is released in a small, poorly-ventilated area (i.e. an enclosed or confined space). Under this circumstance, an oxygen-deficient environment may occur. Individuals breathing such an atmosphere may experience symptoms which include headaches, ringing in ears, dizziness, drowsiness, unconsciousness, nausea, vomiting, and depression of all the senses. Under some circumstances of over-exposure, death may occur. The effects associated with various levels of oxygen are as follows:

CONCENTRATION OF OXYGEN	OBSERVED EFFECT
12-16% Oxygen:	Breathing and pulse rate increase, muscular coordination slightly disturbed.
10-14% Oxygen:	Emotional upset, abnormal fatigue, disturbed respiration.
6-10% Oxygen:	Nausea, vomiting, collapse, or loss of consciousness.
Below 6%:	Convulsive movements, possible respiratory collapse, and death.

HAZARDOUS MATERIAL INFORMATION SYSTEM

HEALTH	(BLUE)	1
FLAMMABILITY	(RED)	0
REACTIVITY	(YELLOW)	0
PROTECTIVE EQUIPMENT		B

EYES	RESPIRATORY	HANDS	BODY
See Section 8			

For routine industrial applications

HEALTH EFFECTS OR RISKS FROM EXPOSURE: An Explanation in Lay Terms. Over-exposure to this gas mixture may cause the following health effects:

ACUTE: Due to the small size of the individual cylinder of this product, no unusual health effects from exposure to the product are anticipated under routine circumstances of use. The most significant hazard associated with this gas mixture when it contains less than 19.5% oxygen is the potential for exposure to oxygen-deficient atmospheres. Symptoms of oxygen deficiency include respiratory difficulty, ringing in ears, headaches, shortness of breath, wheezing, headache, dizziness, indigestion, nausea, unconsciousness, and death. The skin of a victim of over-exposure may have a blue color. Additionally, Isobutylene, a component of this gas mixture, may cause drowsiness or central nervous system effects in high concentrations; however, due to its low concentration in this gas mixture, this is unlikely to occur.

CHRONIC: There are currently no known adverse health effects associated with chronic exposure to this gas mixture.

TARGET ORGANS: Respiratory system.

4. FIRST-AID MEASURES

RESCUERS SHOULD NOT ATTEMPT TO RETRIEVE VICTIMS OF EXPOSURE TO THIS PRODUCT WITHOUT ADEQUATE PERSONAL PROTECTIVE EQUIPMENT. At a minimum, Self-Contained Breathing Apparatus must be worn.

No unusual health effects are anticipated after exposure to this product, due to the small cylinder size. If any adverse symptom develops after over-exposure to this product, remove victim(s) to fresh air as quickly as possible. Only trained personnel should administer supplemental oxygen and/or cardio-pulmonary resuscitation if necessary.

4. FIRST-AID MEASURES (Continued)

Victim(s) who experience any adverse effect after over-exposure to this product must be taken for medical attention. Rescuers should be taken for medical attention if necessary. Take a copy of the label and the MSDS to physician or other health professional with victim(s).

5. FIRE-FIGHTING MEASURES

FLASH POINT, (method): Not applicable.

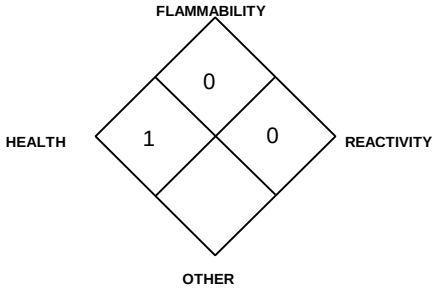
AUTOIGNITION TEMPERATURE: Not applicable.

FLAMMABLE LIMITS (in air by volume, %):
Lower (LEL): Not applicable.
Upper (UEL): Not applicable.

FIRE EXTINGUISHING MATERIALS: Non-flammable gas mixture. Use extinguishing media appropriate for surrounding fire.

UNUSUAL FIRE AND EXPLOSION HAZARDS: This gas mixture is not flammable; however, containers, when involved in fire, may rupture or burst in the heat of the fire.

NFPA RATING



Explosion Sensitivity to Mechanical Impact: Not sensitive.
Explosion Sensitivity to Static Discharge: Not sensitive.

SPECIAL FIRE-FIGHTING PROCEDURES: Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment.

6. ACCIDENTAL RELEASE MEASURES

LEAK RESPONSE: Due to the small size and content of the cylinder, an accidental release of this product presents significantly less risk of an oxygen deficient environment and other safety hazards than a similar release from a larger cylinder. However, as with any chemical release, extreme caution must be used during emergency response procedures. In the event of a release in which the atmosphere is unknown, and in which other chemicals are potentially involved, evacuate immediate area. Such releases should be responded to by trained personnel using pre-planned procedures. Proper protective equipment should be used. In case of a leak, clear the affected area, protect people, and respond with trained personnel.

Allow the gas mixture to dissipate. If necessary, monitor the surrounding area (and the original area of the release) for oxygen. Oxygen levels must be above 19.5% before non-emergency personnel are allowed to re-enter area.

If leaking incidentally from the cylinder, contact your supplier.

7. HANDLING and USE

WORK PRACTICES AND HYGIENE PRACTICES: Be aware of any signs of dizziness or fatigue, especially if work is done in a poorly-ventilated area; exposures to fatal concentrations of this product could occur without any significant warning symptoms, due to oxygen deficiency. Do not attempt to repair, adjust, or in any other way modify cylinders containing this gas mixture. If there is a malfunction or another type of operational problem, contact nearest distributor immediately.

STORAGE AND HANDLING PRACTICES: Cylinders should be firmly secured to prevent falling or being knocked-over. Cylinders must be protected from the environment, and preferably kept at room temperature (approximately 21°C; 70°F). Cylinders should be stored in dry, well-ventilated areas, away from sources of heat, ignition, and direct sunlight. Protect cylinders against physical damage.

Full and empty cylinders should be segregated. Use a first-in, first-out inventory system to prevent full containers from being stored for long periods of time. These cylinders are not refillable. **WARNING! Do not refill DOT 39 cylinders. To do so may cause personal injury or property damage.**

SPECIAL PRECAUTIONS FOR HANDLING GAS CYLINDERS: WARNING! Compressed gases can present significant safety hazards. During cylinder use, use equipment designed for these specific cylinders. Ensure all lines and equipment are rated for proper service pressure.

PROTECTIVE PRACTICES DURING MAINTENANCE OF CONTAMINATED EQUIPMENT: Follow practices indicated in Section 6 (Accidental Release Measures). Make certain that application equipment is locked and tagged-out safely. Always use product in areas where adequate ventilation is provided.

8. EXPOSURE CONTROLS - PERSONAL PROTECTION

VENTILATION AND ENGINEERING CONTROLS: No special ventilation systems or engineering controls are needed under normal circumstances of use. As with all chemicals, use this product in well-ventilated areas. If this product is used in a poorly-ventilated area, install automatic monitoring equipment to detect the levels of oxygen.

RESPIRATORY PROTECTION: No special respiratory protection is required under normal circumstances of use. Use supplied air respiratory protection if oxygen levels are below 19.5% or unknown during emergency response to a release of this product. If respiratory protection is required for emergency response to this product, follow the requirements of the Federal OSHA Respiratory Protection Standard (29 CFR 1910.134) or equivalent State standards.

EYE PROTECTION: Safety glasses.

HAND PROTECTION: No special protection is needed under normal circumstances of use.

BODY PROTECTION: No special protection is needed under normal circumstances of use.

9. PHYSICAL and CHEMICAL PROPERTIES

Unless otherwise specified, the following information is for Nitrogen, the main component of this gas mixture.

GAS DENSITY @ 32°F (0°C) and 1 atm: 0.072 lbs/ ft^3 (1.153 kg/m^3)

BOILING POINT: -195.8°C (-320.4 °F)

FREEZING/MELTING POINT @ 10 psig -210°C (-345.8°F)

SPECIFIC GRAVITY (air = 1) @ 70°F (21.1°C): 0.906 **pH**: Not applicable.

SOLUBILITY IN WATER vol/vol @ 32°F (0°C) and 1 atm: 0.023 **MOLECULAR WEIGHT:** 28.01

EVAPORATION RATE (nBuAc = 1): Not applicable. **EXPANSION RATIO**: Not applicable.

ODOR THRESHOLD: Not applicable. **SPECIFIC VOLUME (ft^3/lb)**: 13.8

VAPOR PRESSURE @ 70°F (21.1°C) psig: Not applicable.

COEFFICIENT WATER/OIL DISTRIBUTION: Not applicable.

The following information is for this gas mixture.

APPEARANCE AND COLOR: This product is a colorless, odorless gas.

HOW TO DETECT THIS SUBSTANCE (warning properties): There are no unusual warning properties associated with a release of this product.

10. STABILITY and REACTIVITY

STABILITY: Normally stable in gaseous state.

DECOMPOSITION PRODUCTS: The thermal decomposition products of Isobutylene include carbon oxides. The other components of this gas mixture do not decompose, per se, but can react with other compounds in the heat of a fire.

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Titanium will burn in Nitrogen (the main component of this product). Lithium reacts slowly with Nitrogen at ambient temperatures. A component of this product (Isobutylene) are also incompatible with strong oxidizers (i.e. chlorine, bromine pentafluoride, oxygen difluoride, and nitrogen trifluoride).

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Contact with incompatible materials. Cylinders exposed to high temperatures or direct flame can rupture or burst.

11. TOXICOLOGICAL INFORMATION

TOXICITY DATA: The following toxicology data are available for the components of this product:

NITROGEN: There are no specific toxicology data for Nitrogen. Nitrogen is a simple asphyxiant, which acts to displace oxygen in the environment.

ISOBUTYLENE:
LC_{50} (inhalation, rat) = 620,000 mg/kg/4 hours
LC_{50} (inhalation, mouse) = 415,000 mg/kg

11. TOXICOLOGICAL INFORMATION (Continued)

SUSPECTED CANCER AGENT: The components of this gas mixture are not found on the following lists: FEDERAL OSHA Z LIST, NTP, CAL/OSHA, and IARC; therefore, they are not considered to be, nor suspected to be, cancer-causing agents by these agencies.

IRRITANCY OF PRODUCT: Not applicable.

SENSITIZATION TO THE PRODUCT: This gas mixture is not known to cause sensitization in humans.

REPRODUCTIVE TOXICITY INFORMATION: Listed below is information concerning the effects of this product and its components on the human reproductive system.

Mutagenicity: No mutagenicity effects have been described for this gas mixture.
Embryotoxcity: No embryotoxic effects have been described for this gas mixture.
Teratogenicity: No teratogenicity effects have been described for this gas mixture.
Reproductive Toxicity: No reproductive toxicity effects have been described for gas mixture.

A mutagen is a chemical which causes permanent changes to genetic material (DNA) such that the changes will propagate through generation lines. An embryotoxin is a chemical which causes damage to a developing embryo (i.e. within the first eight weeks of pregnancy in humans), but the damage does not propagate across generational lines. A teratogen is a chemical which causes damage to a developing fetus, but the damage does not propagate across generational lines. A reproductive toxin is any substance which interferes in any way with the reproductive process.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Acute or chronic respiratory conditions may be aggravated by over-exposure to the components of this product.

RECOMMENDATIONS TO PHYSICIANS: Administer oxygen, if necessary; treat symptoms; eliminate exposure.

BIOLOGICAL EXPOSURE INDICES (BEIs): Currently, Biological Exposure Indices (BEIs) are not applicable for the components of this gas mixture.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL STABILITY: The components of this gas mixture occur naturally in the atmosphere. The gas will be dissipated rapidly in well-ventilated areas. The following environmental data are applicable to the components of this product.

OXYGEN: Water Solubility = 1 volume Oxygen/32 volumes water at 20°C. Log K_{ow} = -0.65
NITROGEN: Water Solubility = 2.4 volumes Nitrogen/100 volumes water at 0°C. 1.6 volumes Nitrogen/100 volumes water at 20°C.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: No evidence is currently available on this product's effects on plant and animal life.

EFFECT OF CHEMICAL ON AQUATIC LIFE: No evidence is currently available on this product's effects on aquatic life.

13. DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations. Cylinders with undesired residual product may be safely vented outdoors with the proper regulator. For further information, refer to Section 16 (Other Information).

14. TRANSPORTATION INFORMATION

THIS MATERIAL IS HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME: Compressed gases, n.o.s. (Nitrogen, Oxygen)
HAZARD CLASS NUMBER and DESCRIPTION: 2.2 (Non-Flammable Gas)
UN IDENTIFICATION NUMBER: UN 1956
PACKING GROUP: Not applicable.
DOT LABEL(S) REQUIRED: Non-Flammable Gas
NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (1996): 126

MARINE POLLUTANT: The components of this gas mixture are not classified by the DOT as Marine Pollutants (as defined by 49 CFR 172.101, Appendix B).

14. TRANSPORTATION INFORMATION (Continued)

SPECIAL SHIPPING INFORMATION: Cylinders should be transported in a secure position, in a well-ventilated vehicle. The transportation of compressed gas cylinders in automobiles or in closed-body vehicles can present serious safety hazards. If transporting these cylinders in vehicles, ensure these cylinders are not exposed to extremely high temperatures (as may occur in an enclosed vehicle on a hot day). Additionally, the vehicle should be well-ventilated during transportation.

Note: DOT 39 Cylinders ship in a strong outer carton (overpack). Pertinent shipping information goes on the outside of the overpack. DOT 39 Cylinders do not have transportation information on the cylinder itself.

TRANSPORT CANADA TRANSPORTATION OF DANGEROUS GOODS REGULATIONS: THIS MATERIAL IS CONSIDERED AS DANGEROUS GOODS. Use the above information for the preparation of Canadian Shipments.

15. REGULATORY INFORMATION

SARA REPORTING REQUIREMENTS: This product is subject to the reporting requirements of Sections 302, 304, and 313 of Title III of the Superfund Amendments and Reauthorization Act, as follows:

COMPONENT	SARA 302	SARA 304	SARA 313
Oxygen	NO	NO	NO
Nitrogen	NO	NO	NO
Isobutylene	NO	NO	NO

SARA THRESHOLD PLANNING QUANTITY: Not applicable.

TSCA INVENTORY STATUS: The components of this gas mixture are listed on the TSCA Inventory.

CERCLA REPORTABLE QUANTITY (RQ): Not applicable.

OTHER U.S. FEDERAL REGULATIONS:

- No component of this product is subject to the requirements of CFR 29 1910.1000 (under the 1989 PELs).
- Isobutylene is subject to the reporting requirements of Section 112(r) of the Clean Air Act. The Threshold Quantity for this gas is 10,000 pounds.
- The regulations of the Process Safety Management of Highly Hazardous Chemicals are not applicable (29 CFR 1910.119).
- This gas mixture does not contain any Class I or Class II ozone depleting chemicals (40 CFR Part 82).
- Nitrogen and Oxygen are not listed as Regulated Substances, per 40 CFR, Part 68, of the Risk Management for Chemical Releases. Isobutylene is listed under this regulation in Table 3 as Regulated Substances (Flammable Substances), in quantities of 10,000 lbs (4,553 kg) or greater.

OTHER CANADIAN REGULATIONS: This gas mixture is categorized as a Controlled Product, Hazard Class A, as per the Controlled Product Regulations.

STATE REGULATORY INFORMATION: The components of this gas mixture are covered under the following specific State regulations:

Alaska - Designated Toxic and Hazardous Substances: No.
California - Permissible Exposure Limits for Chemical Contaminants: Nitrogen.
Florida - Substance List: Oxygen, Isobutylene.
Illinois - Toxic Substance List: No.
Kansas - Section 302/313 List: No.
Massachusetts - Substance List: Oxygen, Isobutylene.
Michigan - Critical Materials Register: No.
Minnesota - List of Hazardous Substances: No.
Missouri - Employer Information/Toxic Substance List: No.
New Jersey - Right to Know Hazardous Substance List: Oxygen, Nitrogen, Isobutylene.
North Dakota - List of Hazardous Chemicals, Reportable Quantities: No.
Pennsylvania - Hazardous Substance List: Oxygen, Nitrogen, Isobutylene.
Rhode Island - Hazardous Substance List: Oxygen, Nitrogen.
Texas - Hazardous Substance List: No.
West Virginia - Hazardous Substance List: No.
Wisconsin - Toxic and Hazardous Substances: : No.

CALIFORNIA PROPOSITION 65: No component of this product is on the California Proposition 65 lists.

16. OTHER INFORMATION

INFORMATION ABOUT DOT-39 NRC (Non-Refillable Cylinder) PRODUCTS

DOT 39 cylinders ship as hazardous materials when full. Once the cylinders are relieved of pressure (empty) they are not considered hazardous material or waste. Residual gas in this type of cylinder is not an issue because toxic gas mixtures are prohibited. Calibration gas mixtures typically packaged in these cylinders are Nonflammable n.o.s., UN 1956. A small percentage of calibration gases packaged in DOT 39 cylinders are flammable or oxidizing gas mixtures.

For disposal of used DOT-39 cylinders, it is acceptable to place them in a landfill if local laws permit. Their disposal is no different than that employed with other DOT containers such as spray paint cans, household aerosols, or disposable cylinders of propane (for camping, torch etc.). When feasible, we recommended recycling for scrap metal content. Air Liquide America will do this for any customer that wishes to return cylinders to us prepaid. All that is required is a phone call to make arrangements so we may anticipate arrival. Scrapping cylinders involves some preparation before the metal dealer may accept them. We perform this operation as a service to valued customers who want to participate.

MIXTURES: When two or more gases or liquefied gases are mixed, their hazardous properties may combine to create additional, unexpected hazards. Obtain and evaluate the safety information for each component before you produce the mixture. Consult an Industrial Hygienist or other trained person when you make your safety evaluation of the end product. Remember, gases and liquids have properties which can cause serious injury or death.

Further information about the handling of compressed gases can be found in the following pamphlets published by: Compressed Gas Association Inc. (CGA), 1725 Jefferson Davis Highway, Suite 1004, Arlington, VA 22202-4102. Telephone: (703) 412-0900.

P-1 *"Safe Handling of Compressed Gases in Containers"*
AV-1 *"Safe Handling and Storage of Compressed Gases"*
"Handbook of Compressed Gases"

PREPARED BY: CHEMICAL SAFETY ASSOCIATES, Inc.
9163 Chesapeake Drive, San Diego, CA 92123-1002
619/565-0302

Fax on Demand: 1-800/231-1366

AIR LIQUIDE™

MSDS Number: **N3661** * * * * * *Effective Date:* ***01/19/06*** * * * * * *Supercedes:* ***04/13/05***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

J.T.Baker®

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300
National Response in Canada
CANUTEC: 613-996-6666
Outside U.S. And Canada
Chemtrec: 703-527-3887

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

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

NITRIC ACID ULTREX II

1. Product Identification

Synonyms: Aqua Fortis; Azotic Acid
CAS No.: 7697-37-2
Molecular Weight: 63.00
Chemical Formula: HNO3
Product Codes: 6901

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Nitric Acid	7697-37-2	65 - 70%	Yes
Water	7732-18-5	29 - 35%	No

3. Hazards Identification

Emergency Overview

POISON! DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 4 - Extreme (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 3 - Severe (Oxidizer)
Contact Rating: 4 - Extreme (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White (Corrosive)

Potential Health Effects

Nitric acid is extremely hazardous; it is corrosive, reactive, an oxidizer, and a poison.

Inhalation:
Corrosive! Inhalation of vapors can cause breathing difficulties and lead to pneumonia and pulmonary edema, which may be fatal. Other symptoms may include coughing, choking, and irritation of the nose, throat, and respiratory tract.
Ingestion:
Corrosive! Swallowing nitric acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract.
Skin Contact:
Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and stain skin a yellow or yellow-brown color.
Eye Contact:
Corrosive! Vapors are irritating and may cause damage to the eyes. Contact may cause severe burns and permanent eye damage.
Chronic Exposure:
Long-term exposure to concentrated vapors may cause erosion of teeth and lung damage. Long-term exposures seldom occur due to the corrosive properties of the acid.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders, eye disease, or cardiopulmonary diseases may be more susceptible to the effects of this substance.

4. First Aid Measures

Immediate first aid treatment reduces the health effects of this substance.

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion:
DO NOT INDUCE VOMITING! Give large quantities of water or milk if available. Never give anything by mouth to an unconscious person. Get medical attention immediately.
Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

5. Fire Fighting Measures

Fire:
Not combustible, but substance is a strong oxidizer and its heat of reaction with reducing agents or combustibles may cause ignition. Can react with metals to release flammable hydrogen gas.
Explosion:
Reacts explosively with combustible organic or readily oxidizable materials such as: alcohols, turpentine, charcoal, organic refuse, metal powder, hydrogen sulfide, etc. Reacts with most metals to release hydrogen gas which can form explosive mixtures with air.
Fire Extinguishing Media:
Water spray may be used to keep fire exposed containers cool. Do not get water inside container.
Special Information:
Increases the flammability of combustible, organic and readily oxidizable materials. In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

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

J. T. Baker NEUTRASORB® or TEAM® 'Low Na+' acid neutralizers are recommended for spills of this product.

7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, the acid should always be added slowly to water and in small amounts. Never use hot water and never add water to the acid. Water added to acid can cause uncontrolled boiling and splashing. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
2 ppm (TWA), 4 ppm (STEL)
-ACGIH Threshold Limit Value (TLV):
2 ppm (TWA); 4 ppm (STEL)

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded, wear a supplied air, full-facepiece respirator, airlined hood, or full-facepiece self-contained breathing apparatus. Nitric acid is an oxidizer and should not come in contact with cartridges and canisters that contain oxidizable materials, such as activated charcoal. Canister-type respirators using sorbents are ineffective.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Colorless to yellowish liquid.
Odor:
Suffocating, acrid.
Solubility:
Infinitely soluble.
Specific Gravity:
1.41
pH:
1.0 (0.1M solution)

% Volatiles by volume @ 21C (70F):
100 (as water and acid)
Boiling Point:
122C (252F)
Melting Point:
-42C (-44F)
Vapor Density (Air=1):
2-3
Vapor Pressure (mm Hg):
48 @ 20C (68F)
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Containers may burst when heated.
Hazardous Decomposition Products:
When heated to decomposition, emits toxic nitrogen oxides fumes and hydrogen nitrate. Will react with water or steam to produce heat and toxic and corrosive fumes.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
A dangerously powerful oxidizing agent, concentrated nitric acid is incompatible with most substances, especially strong bases, metallic powders, carbides, hydrogen sulfide, turpentine, and combustible organics.
Conditions to Avoid:
Light and heat.

11. Toxicological Information

Nitric acid: Inhalation rat LC50: 244 ppm (NO2)/30M; Investigated as a mutagen, reproductive effector. Oral (human) LDLo: 430 mg/kg.

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

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Nitric Acid (7697-37-2)	No	No	None
Water (7732-18-5)	No	No	None

12. Ecological Information

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

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be managed in an appropriate and approved waste facility. Although not a listed RCRA hazardous waste, this material may exhibit one or more characteristics of a hazardous waste and require appropriate analysis to determine specific disposal requirements. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: NITRIC ACID (WITH NOT MORE THAN 70% NITRIC ACID)
Hazard Class: 8
UN/NA: UN2031
Packing Group: II
Information reported for product/size: 2L

International (Water, I.M.O.)

Proper Shipping Name: NITRIC ACID (WITH NOT MORE THAN 70% NITRIC ACID)
Hazard Class: 8
UN/NA: UN2031
Packing Group: II
Information reported for product/size: 2L

15. Regulatory Information

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

Ingredient	TSCA	EC	Japan	Australia
Nitric Acid (7697-37-2)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

Ingredient	Korea	Canada-- DSL	NDSL	Phil.
Nitric Acid (7697-37-2)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Nitric Acid (7697-37-2)	1000	1000	Yes	No
Water (7732-18-5)	No	No	No	No

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Nitric Acid (7697-37-2)	1000	No	No
Water (7732-18-5)	No	No	No

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

Australian Hazchem Code: 2PE
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

---

16. Other Information

NFPA Ratings: Health: **4** Flammability: **0** Reactivity: **0** Other: **Oxidizer**
Label Hazard Warning:
POISON! DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED. INHALATION MAY CAUSE LUNG AND TOOTH DAMAGE.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe vapor or mist.
Use only with adequate ventilation.
Wash thoroughly after handling.
Keep from contact with clothing and other combustible materials.
Do not store near combustible materials.
Store in a tightly closed container.
Remove and wash contaminated clothing promptly.
Label First Aid:
In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In all cases get medical attention immediately.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 14, 16.
Disclaimer:
****
Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****
Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

ORION RESEARCH INC -- ALKALINE REAGENT 10N NAOH, 951011 -- 6850-00N037887

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

Product ID:ALKALINE REAGENT 10N NAOH, 951011
MSDS Date:09/05/1986
FSC:6850
NIIN:00N037887
MSDS Number: BQWWT
=== Responsible Party ===
Company Name:ORION RESEARCH INC
Address:529 MAIN ST
City:BOSTON
State:MA
ZIP:02129
Country:US
Info Phone Num:617-242-3900
Emergency Phone Num:617-242-3900
Preparer's Name:MICHAEL H. SWIGNY
CAGE:30260
=== Contractor Identification ===
Company Name:ORION RESEARCH INC
Address:529 MAIN ST
Box:City:BOSTON
State:MA
ZIP:02129
Country:US
Phone:617-242-3900
CAGE:30260

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

Ingred Name:SODIUM HYDROXIDE (SARA III)
CAS:1310-73-2
RTECS #:WB4900000
Fraction by Wt: 40%
OSHA PEL:2 MG/M3
ACGIH TLV:C 2 MG/M3; 9293
EPA Rpt Qty:1000 LBS
DOT Rpt Qty:1000 LBS

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

LD50 LC50 Mixture:NONE SPECIFIED BY MANUFACTURER.
Routes of Entry: Inhalation:YES Skin:YES Ingestion:YES
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Health Hazards Acute and Chronic:ACUTE:INHAL:MILD TO SEV IRRIT, LG
DOSES-DELAYED PULM EDEMA. SKIN: SM SKIN BURNS W/DEEP ULCERATION.
EYES: SEV BURNS & DISINTEGRATION OF CONJUNCTIVAL & CORNEAL
EPITHELIUM. INGEST: CORR OF LIPS, MOUTH, T ONGUE & PHARYNX, VOMIT
OF MUCOSA-ASPHYXIA CAN OCCUR FROM SWELLING OF THROAT. CHRONIC:
BRONCHIAL IRRITANT, (SUPP DATA)
Explanation of Carcinogenicity:NOT RELEVANT
Effects of Overexposure:SORE THROAT, COUGHING, LABORED BREATHING -
BURNS OF SKIN, EYES, MUCOUS MEMBRANES.
Medical Cond Aggravated by Exposure:LUNG CONDITIONS, IRRITATED OR
SENSITIVE SKIN.

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

First Aid:ALL EXPOSURES: GET MEDICAL ATTENTION. INHAL: FRESH AIR, ARTIFICIAL RESPIRATION IF NECESSARY. KEEP WARM & AT REST. SKIN: WASH WITH SOAP AND LG AMOUNTS OF WATER WHILE REMOVING CONTAMINATED CLOTHING. EYE S: FLUSH W/LARGE AMOUNTS OF WATER WHILELIFTING LIDS (AT LST 15-20 MIN). INGEST: GIVE LARGE AMOUNTS OF MILK OR WATER AND ALLOW VOMITING TO OCCUR. DO NOT INDUCE VOMITING.

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

Flash Point:NOT COMBUSTIBLE
Extinguishing Media:USE MEDIA SUITABLE FOR SURROUNDING FIRE .
Fire Fighting Procedures:WEAR NIOSH/MSHA APPRVD SCBA & FULL PROT EQUIP . MOVE CNTNRS AWAY IF POSS, COOL FROM SIDE, USE FLOODING QTYS OF WATER AS FOG. APPLY FROM (SUPP DATA)
Unusual Fire/Explosion Hazard:NEGLIGIBLE FIRE AND EXPLOSION HAZARD WHEN EXPOSED TO HEAT OR FLAME.

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

Spill Release Procedures:VENTILATE AREA, WEAR IMPERVIOUS GLOVES, CLOTHING AND A FACESHIELD. PREVENT SKIN CONTACT. PICK UP, NEUTRALIZE WITH HCL, FLUSH RESULTING SODIUM CHLORIDE SOLUTION DOWN DRAIN.
Neutralizing Agent:HCL.

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

Handling and Storage Precautions:KEEP COOL AND WELL SEALED. STORE AWAY FROM ACIDS, FLAMMABLES.
Other Precautions:WILL ATTACK SOME FORMS OF PLASTICS, RUBBER AND COATINGS.

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

Respiratory Protection:AT >100 MG/M3 WEAR NIOSH/MSHA APPROVED SCBA WITH FULL FACEPLATE.
Ventilation:LOCAL EXHAUST: TO MEET EXPOSURE LIMITS.
Protective Gloves:IMPERVIOUS GLOVES.
Eye Protection:CHEM WORK GOG & FULL LGTH FSHLD .
Other Protective Equipment:IMPERVIOUS CLOTHING. DELUGE SHOWER . EMERGENCY EYEWASH SHOULD BE AVAILABLE.
Work Hygienic Practices:NO EATING OR SMOKING WHILE USING.
Supplemental Safety and Health
FIRE FIGHT PROC: DISTANCE, STAY UPWIND. AVOID BREATHING. HLTH HAZ: COUGHING, PNEUMONIA, GI DISTURBANCES, DERMATITIS, CONJUNCTIVITIS.

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

Boiling Pt:B.P. Text:>230F,>110C
Melt/Freeze Pt:M.P/F.P Text:>-4F,>-20C
Spec Gravity:1.4 (H*2O=1)
pH:14
Solubility in Water:MISCIBLE
Appearance and Odor:COLORLESS ODORLESS SOLUTION.

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

Stability Indicator/Materials to Avoid:YES
CONTACT WITH ACIDS, FLAMMABLE LIQUID, AND ORGANIC HALOGEN COMPOUNDS MAY

CAUSE FIRE.
Stability Condition to Avoid:CONTACT WITH WATER MAY CAUSE HEAT TO BE RELEASED.
Hazardous Decomposition Products:MAY RELEASE TOXIC FUMES OF SODIUM OXIDE WHICH CAN REACT WITH WATER OR STEAM TO PRODUCE HEAT OR FLAMMABLE H*2 GAS.

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

Waste Disposal Methods:DISPOSE OF I/A/W FEDERAL, STATE AND LOCAL REGULATIONS .

MSDS Number: **S8234** * * * * * *Effective Date:* ***02/04/05*** * * * * * *Supercedes:* ***11/04/04***

MSDS Material Safety Data Sheet

From: Mallinckrodt Baker, Inc.
222 Red School Lane
Phillipsburg, NJ 08865

Mallinckrodt CHEMICALS J.T.Baker

24 Hour Emergency Telephone: 908-859-2151
CHEMTREC: 1-800-424-9300

National Response in Canada
CANUTEC: 613-996-6666

Outside U.S. and Canada
Chemtrec: 703-527-3887

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

All non-emergency questions should be directed to Customer Service (1-800-582-2537) for assistance.

SULFURIC ACID, 52 - 100 %

1. Product Identification

Synonyms: Oil of vitriol; Babcock acid; sulphuric acid
CAS No.: 7664-93-9
Molecular Weight: 98.08
Chemical Formula: H2SO4 in H2O
Product Codes:
J.T. Baker: 5030, 5137, 5374, 5802, 5815, 5858, 5859, 5868, 5889, 5897, 5961, 5971, 5997, 6902, 9671, 9673, 9674, 9675, 9676, 9679, 9680, 9681, 9682, 9684, 9687, 9691, 9693, 9694
Mallinckrodt: 21201, 2468, 2876, 2878, 2900, 2904, 3780, 4222, 5524, 5557, H644, H850, H976, H996, V651, XL003

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Sulfuric Acid	7664-93-9	52 - 100%	Yes
Water	7732-18-5	0 - 48%	No

3. Hazards Identification

Emergency Overview

POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR CONTACTED WITH SKIN. HARMFUL IF INHALED. AFFECTS TEETH. WATER REACTIVE. CANCER HAZARD. STRONG INORGANIC ACID MISTS CONTAINING SULFURIC ACID CAN CAUSE CANCER. Risk of cancer depends on duration and level of exposure.

SAF-T-DATA(tm) Ratings (Provided here for your convenience)

Health Rating: 4 - Extreme (Poison)
Flammability Rating: 0 - None
Reactivity Rating: 2 - Moderate
Contact Rating: 4 - Extreme (Corrosive)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES
Storage Color Code: White (Corrosive)

Potential Health Effects

Inhalation:
Inhalation produces damaging effects on the mucous membranes and upper respiratory tract. Symptoms may include irritation of the nose and throat, and labored breathing. May cause lung edema, a medical emergency.
Ingestion:
Corrosive. Swallowing can cause severe burns of the mouth, throat, and stomach, leading to death. Can cause sore throat, vomiting, diarrhea. Circulatory collapse with clammy skin, weak and rapid pulse, shallow respirations, and scanty urine may follow ingestion or skin contact. Circulatory shock is often the immediate cause of death.
Skin Contact:
Corrosive. Symptoms of redness, pain, and severe burn can occur. Circulatory collapse with clammy skin, weak and rapid pulse, shallow respirations, and scanty urine may follow skin contact or ingestion. Circulatory shock is often the immediate cause of death.
Eye Contact:
Corrosive. Contact can cause blurred vision, redness, pain and severe tissue burns. Can cause blindness.
Chronic Exposure:
Long-term exposure to mist or vapors may cause damage to teeth. Chronic exposure to mists containing sulfuric acid is a cancer hazard.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems or impaired respiratory function may be more susceptible to the effects of the substance.

4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician immediately.
Ingestion:
DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Call a physician immediately.
Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Excess acid on skin can be neutralized with a 2% solution of bicarbonate of soda. Call a physician immediately.
Eye Contact:
Immediately flush eyes with gentle but large stream of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Call a physician immediately.

5. Fire Fighting Measures

Fire:
Concentrated material is a strong dehydrating agent. Reacts with organic materials and may cause ignition of finely divided materials on contact.
Explosion:
Contact with most metals causes formation of flammable and explosive hydrogen gas.
Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Do not use water on material. However, water spray may be used to keep fire exposed containers cool.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Structural firefighter's protective clothing is ineffective for fires involving this material. Stay away from sealed containers.

6. Accidental Release Measures

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

J. T. Baker NEUTRASORB® or TEAM® 'Low Na+' acid neutralizers are recommended for spills of this product.

7. Handling and Storage

Store in a cool, dry, ventilated storage area with acid resistant floors and good drainage. Protect from physical damage. Keep out of direct sunlight and away from heat, water, and incompatible materials. Do not wash out container and use it for other purposes. When diluting, always add the acid to water; never add water to the acid. When opening metal containers, use non-sparking tools because of the possibility of hydrogen gas being present. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
For Sulfuric Acid:
- OSHA Permissible Exposure Limit (PEL) -
1 mg/m3 (TWA)
- ACGIH Threshold Limit Value (TLV) -
0.2 mg/m3(T) (TWA) for sulfuric acid - A2 Suspected Human Carcinogen for sulfuric acid contained in strong inorganic mists.
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a full facepiece respirator with an acid gas cartridge and particulate filter (NIOSH type N100 filter) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P particulate filter. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air purifying respirators do not protect workers in oxygen-deficient atmospheres. Where respirators are required, you must have a written program covering the basic requirements in the OSHA respirator standard. These include training, fit testing, medical approval, cleaning, maintenance, cartridge change schedules, etc. See 29CFR1910.134 for details.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear oily liquid.
Odor:
Odorless.
Solubility:
Miscible with water, liberates much heat.
Specific Gravity:
1.84 (98%), 1.40 (50%), 1.07 (10%)
pH:
1 N solution (ca. 5% w/w) = 0.3; 0.1 N solution (ca. 0.5% w/w) = 1.2; 0.01 N solution (ca. 0.05% w/w) = 2.1.
% Volatiles by volume @ 21C (70F):
No information found.

Boiling Point:
ca. 290C (ca. 554F) (decomposes at 340C)
Melting Point:
3C (100%), -32C (93%), -38C (78%), -64C (65%).
Vapor Density (Air=1):
3.4
Vapor Pressure (mm Hg):
1 @ 145.8C (295F)
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Concentrated solutions react violently with water, spattering and liberating heat.
Hazardous Decomposition Products:
Toxic fumes of oxides of sulfur when heated to decomposition. Will react with water or steam to produce toxic and corrosive fumes. Reacts with carbonates to generate carbon dioxide gas, and with cyanides and sulfides to form poisonous hydrogen cyanide and hydrogen sulfide respectively.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Water, potassium chlorate, potassium perchlorate, potassium permanganate, sodium, lithium, bases, organic material, halogens, metal acetylides, oxides and hydrides, metals (yields hydrogen gas), strong oxidizing and reducing agents and many other reactive substances.
Conditions to Avoid:
Heat, moisture, incompatibles.

11. Toxicological Information

Toxicological Data:
Oral rat LD50: 2140 mg/kg; inhalation rat LC50: 510 mg/m3/2H; standard Draize, eye rabbit, 250 ug (severe); investigated as a tumorigen, mutagen, reproductive effector.
Carcinogenicity:
Cancer Status: The International Agency for Research on Cancer (IARC) has classified "strong inorganic acid mists containing sulfuric acid" as a known human carcinogen, (IARC category 1). This classification applies only to mists containing sulfuric acid and not to sulfuric acid or sulfuric acid solutions.

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

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Sulfuric Acid (7664-93-9)	No	No	None
Water (7732-18-5)	No	No	None

12. Ecological Information

Environmental Fate:
When released into the soil, this material may leach into groundwater. When released into the air, this material may be removed from the atmosphere to a moderate extent by wet deposition. When released into the air, this material may be removed from the atmosphere to a moderate extent by dry deposition.
Environmental Toxicity:
LC50 Flounder 100 to 330 mg/l/48 hr aerated water/Conditions of bioassay not specified; LC50 Shrimp 80 to 90 mg/l/48 hr aerated water /Conditions of bioassay not specified; LC50 Prawn 42.5 ppm/48 hr salt water /Conditions of bioassay not specified.
This material may be toxic to aquatic life.

13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to a RCRA approved incinerator or disposed in a RCRA approved waste facility. Processing, use or contamination of this product may change the waste management options. State and local disposal regulations may differ from federal disposal regulations. Dispose of container and unused contents in accordance with federal, state and local requirements.

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: SULFURIC ACID (WITH MORE THAN 51% ACID)
Hazard Class: 8
UN/NA: UN1830
Packing Group: II
Information reported for product/size: 440LB

International (Water, I.M.O.)

Proper Shipping Name: SULFURIC ACID (WITH MORE THAN 51% ACID)
Hazard Class: 8
UN/NA: UN1830
Packing Group: II
Information reported for product/size: 440LB

15. Regulatory Information

```
--------\Chemical Inventory Status - Part 1\---------------------------------
Ingredient                                    TSCA  EC   Japan  Australia
-----------------------------------------------  ----  ---  -----  ---------
Sulfuric Acid (7664-93-9)                      Yes  Yes   Yes      Yes
Water (7732-18-5)                              Yes  Yes   Yes      Yes

--------\Chemical Inventory Status - Part 2\---------------------------------
                                                      --Canada--
Ingredient                                    Korea  DSL   NDSL  Phil.
-----------------------------------------------  -----  ---   ----  -----
Sulfuric Acid (7664-93-9)                      Yes   Yes   No     Yes
Water (7732-18-5)                              Yes   Yes   No     Yes

--------\Federal, State & International Regulations - Part 1\----------------
                                          -SARA 302-    ------SARA 313------
Ingredient                                RQ    TPQ     List  Chemical Catg.
----------------------------------------  ---   -----   ----  --------------
Sulfuric Acid (7664-93-9)                 1000  1000    Yes        No
Water (7732-18-5)                         No    No      No         No

--------\Federal, State & International Regulations - Part 2\----------------
                                                 -RCRA-    -TSCA-
Ingredient                                CERCLA     261.33     8(d)
----------------------------------------  ------     ------    ------
Sulfuric Acid (7664-93-9)                 1000       No         No
Water (7732-18-5)                         No         No         No


Chemical Weapons Convention:  No     TSCA 12(b):  No     CDTA:  Yes
SARA 311/312:  Acute: Yes      Chronic: Yes  Fire: No  Pressure: No
Reactivity: Yes         (Pure / Liquid)
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Australian Hazchem Code: 2P
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

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16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **2** Other: **Water reactive**
Label Hazard Warning:
POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR CONTACTED WITH SKIN. HARMFUL IF INHALED. AFFECTS TEETH. WATER REACTIVE. CANCER HAZARD. STRONG INORGANIC ACID MISTS CONTAINING SULFURIC ACID CAN CAUSE CANCER. Risk of cancer depends on duration and level of exposure.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe mist.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Do not contact with water.
Label First Aid:
In all cases call a physician immediately. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before re-use. Excess acid on skin can be neutralized with a 2% bicarbonate of soda solution. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 8.
Disclaimer:
****
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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

Job Hazard Analysis Form

JHA No.: JHA -_____-____-___-___

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

Job Location: _____ **Team Leader:** _____

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

Other Referenced JHAs:

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Prepare for Site Visit	1A) N/A	1A) Prior to leaving for site ▪ Obtain and review HASP prior to site visit, if possible ▪ Determine PPE needs – bring required PPE to the site, if not otherwise being provided at the site (e.g., steel toed boots) ▪ Determine training and medical monitoring needs and ensure all required Health and Safety training and medical monitoring has been received and is current ▪ Ensure all workers are fit for duty (alert, well rested, and mentally and physically fit to perform work assignment) ▪ If respiratory protection is required/potentially required, ensure that training and fit-testing has occurred within the past year. ▪ Familiarize yourself with route to the site
	1B) Vehicle defects	1B) Inspect company owned/leased vehicle for defects such as: ▪ Flat tires ▪ Windshield wipers worn or torn ▪ Oil puddles under vehicle ▪ Headlights, brake lights, turn signals not working
	1C) Insufficient emergency equipment, unsecured loads	1C) Insufficient emergency equipment, unsecured loads ▪ Ensure vehicle has first aid kit and that all medications are current (if first aid kits are not provided at the site) ▪ Ensure vehicle is 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

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

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

Job Hazard Analysis Form

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

Job Title: Field Work – General **Date of Analysis:** 5/3/07

Job Location: Rochester, NY **Team Leader:** Chuck Staples

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

Other Referenced JHAs:
- Mobilization/Demobilization and Site Preparation
- Insect Stings and Bites
- Poisonous Plants
- Confined Space Entry

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Mobilization/ Demobilization and Site Preparation	1A) See Mobilization / Demobilization and Site Preparation JHA	1A) See Mobilization/Demobilization and Site Preparation JHA
2. Communication	2A) Safety, crew unity	2A) Talk to each other. ▪ Log all workers and visitor on and off the site. ▪ Let other crewmembers know when you see a hazard. ▪ Avoid working near known hazards. ▪ Always know the 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.

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3C) Chemical/Toxicological Hazards	3C) Chemical/Toxicological Hazards ▪ See HASP for appropriate level of PPE ▪ Use monitoring equipment, as outlined in HASP, to monitor breathing zone ▪ Read MSDSs for all chemicals brought to the site ▪ Be familiar with hazards associated with site contaminants. ▪ Ensure that all containers are properly labelled ▪ Decon thoroughly prior to consumption of food, beverage or tobacco.
	3D) Damage to eyes	3D) Protect eyes: ▪ Watch where you walk, 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
	3H) Contact with poisonous plants or the oil from those plants:	3H) Contact with poisonous plants or the oil from those plants: ▪ Look for signs of poisonous plants and avoid. ▪ Ensure all field workers can identify the plants. Mark identified poisonous plants with spray paint if working at a fixed location. ▪ Do not allow plant to touch any part of your body/clothing. ▪ Wear PPE as described in the HASP and wear Tyveks, gloves and boot covers if contact with plant is likely ▪ Always wash gloves before removing them. ▪ Discard PPE in accordance with the HASP. ▪ Use commercially available products such as Ivy Block or Ivy Wash as appropriate. ▪ See the JHA for Poisonous Plants
		 POISON IVY (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.

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

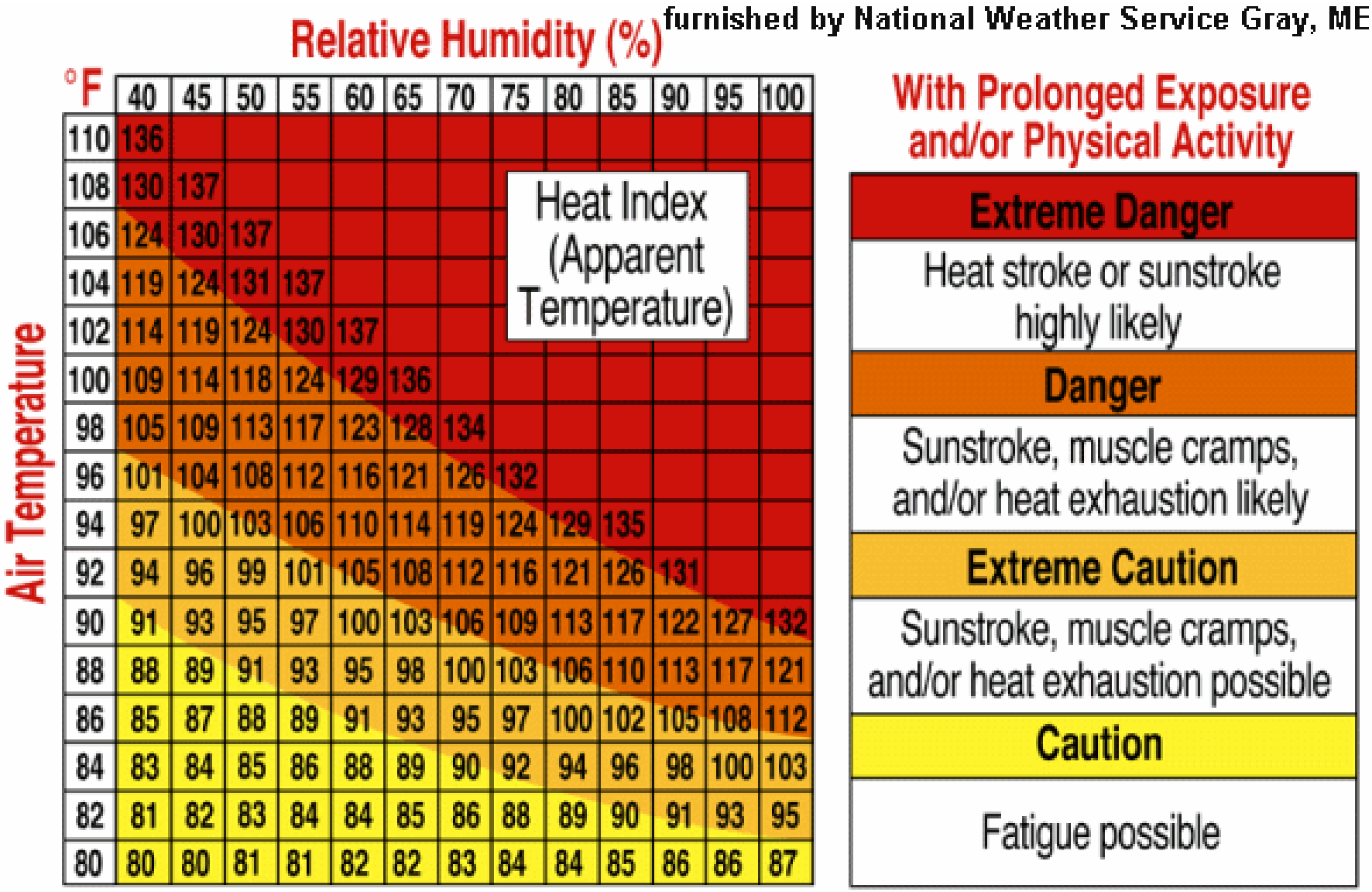
Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3P) Heavy Equipment (overhead hazards, spills, struck by or against)	3P) Heavy Equipment ▪ All operators will be trained and qualified to operate equipment ▪ Equipment will have seat belts. ▪ Operators will wear seat belts when operating equipment. ▪ Do not operate equipment on grades that exceed manufacturer's recommendations. ▪ Equipment will have guards, canopies or grills to protect from flying objects. ▪ Ground personnel will stay clear of all suspended loads. ▪ 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.
	3Q) Struck by vehicle/equipment	3Q) Struck by vehicle/equipment ▪ Be aware of heavy equipment operations. ▪ Keep out of the swing radius of heavy equipment. ▪ Ground personnel in the vicinity of vehicles or heavy equipment operations will be within the view of the operator at all times. ▪ Ground personnel will be aware of the counterweight swing and maintain an adequate buffer zone. ▪ Ground personnel will not stand directly behind heavy equipment when it is in operation. ▪ Drivers will keep workers on foot in their vision at all times, if you lose sight of someone, Stop! ▪ Spotters will be used when backing up trucks and heavy equipment and when moving equipment. ▪ High visibility vests will be worn when workers are exposed to vehicular traffic at the site or on public roads.
	3R) Struck/cut by tools	3R) Struck/cut by tools ▪ Cut resistant work gloves will be worn when dealing with sharp objects. ▪ All hand and power tools will be maintained in safe condition. ▪ Do not drop or throw tools. Tools shall be placed on the ground or worksurface or handed to another employee in a safe manner. ▪ Guards will be kept in place while using hand and power tools.
	3S) Caught in/on/between	3S) Caught in/on/between ▪ Workers will not position themselves between equipment and a stationary object. ▪ Workers will not wear long hair down (place in pony-tail and tuck into shirt) or jewelry if working with tools/machinery.

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3T) Contact with Electricity/Lightning	3T) Contact with Electricity/Lighting ▪ All electrical tools and equipment will be equipped with GFCI. ▪ Electrical extension cords will be of the "Hard" or "Extra Hard" service type. ▪ All extension cords shall have a three-blade grounding plug. ▪ Personnel shall not use extension cords with damaged outer covers, exposed inner wires, or splices. ▪ Electrical cords shall not be laid across roads where vehicular traffic may damage the cord without appropriate guarding. ▪ All electrical work will be conducted by a licensed electrician. ▪ All equipment will be locked out and tagged out and rendered in a zero energy state prior to commencing any operation that may 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.
	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

Key Work Steps	Hazards/Potential Hazards	Safe Practices
4. Environmental health considerations	4A) Heat Stress	4A) Take precautions to prevent heat stress ▪ Remain constantly aware of the four basic factors that determine the degree of heat stress (air temperature, humidity, air movement, and heat radiation) relative to the surrounding work environmental heat load. ▪ Know the signs and symptoms of heat exhaustion, heat cramps, and heat stroke. Heat stroke is a true medical emergency requiring immediate emergency response action. **NOTE: The severity of the effects of a given environmental heat stress is decreased by reducing the work load, increasing the frequency and/or duration of rest periods, and by introducing measures which will protect employees from hot environments.** ▪ Maintain adequate water intake by drinking water periodically in small amounts throughout the day (flavoring water with citrus flavors or extracts enhances palatability). ▪ Allow approximately 2 weeks with progressive degrees of heat exposure and physical exertion for substantial acclimatization. ▪ Acclimatization is necessary regardless of an employee's physical condition (the better one's physical condition, the quicker the acclimatization). Tailor the work schedule to fit the climate, the physical condition of employees, and mission requirements. ▪ A reduction of work load markedly decreases total heat stress. ▪ Lessen work load and/or duration of physical exertion the first days of heat exposure to allow gradual acclimatization. ▪ Alternate work and rest periods. More severe conditions may require longer rest periods and electrolyte fluid replacement.
	4B) Wet Bulb Globe Temperature (WBGT) Index	4B) WBGT ▪ Curtail or suspend physical work when conditions are extremely severe (see attached Heat Stress Index). ▪ Compute a Wet Bulb Globe Temperature Index to determine the level of physical activity (take WBGT index measurements in a location that is similar or closely approximates the environment to which employees will be exposed).
		WBGT THRESHOLD VALUES FOR INSTITUTING PREVENTIVE MEASURES
		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.

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	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)	40	35	30	25	20	15	10	5	0	-5	-10	-15	-20	-25	-30	-35	-40	-45
Calm																		
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

MACTEC

Job Hazard Analysis - HASP Format

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

MACTEC

Job Hazard Analysis - HASP Format

Job Title: Drilling – Pre-ground Disturbance and Clearance Activities **Date of Analysis:** 7/26/06

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

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Job Hazard Analysis - HASP Format

Job Title: Drilling – Pre-ground Disturbance and Clearance Activities **Date of Analysis:** 7/26/06

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

Job Hazard Analysis Form

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

Job Title: Decontamination **Date of Analysis:** 5/1/07

Job Location: _____ **Team Leader:** _____

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

Other Referenced JHAs:

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Establish Decontamination Station	1A) Materials Handling	1A) Materials Handling ▪ Use proper lifting techniques ▪ Use mechanical aids, if available, to move heavy items.
2. Decontamination / Steam cleaning.	2A) Struck by steam/hot water/pressure washing	2A) Struck by steam/hot water ▪ Workers not directly engaged in steam cleaning operations must stay clear. ▪ Workers using steam cleaning equipment must be trained on operation and safety devices/procedures using the owners/operators manual. ▪ Use face shield **and** safety glasses or goggles, if steam cleaning. ▪ Stay out of the splash/steam radius. ▪ Pressure washer must have dead man switch. ▪ Do not direct steam at anyone. ▪ Do not hold objects with your feet or hands. ▪ Ensure that direction of spray minimizes spread of contaminants of concern. ▪ Use shielding as necessary.
	2B) Exposure to contaminants	2B) Exposure to contaminants ▪ Conduct air monitoring (see HASP). ▪ Wear proper PPE. ▪ See MSDSs for hazards associated with the decon solutions used (if other than water alone 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.

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

Job Hazard Analysis Form

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

Job Title: Groundwater Sampling **Date of Analysis:** 8/20/07

Job Location: Rochester, NY **Team Leader/Project Manager:** Chuck Staples

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

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

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

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

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

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)

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

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

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

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Job Hazard Analysis - HASP Format

Job Title: Pore Water Sampling from the Shore **Date of Analysis:** 4/4/07

Minimum Recommended PPE*: Safety Boots/Shoes; Safety Glasses; Rubber boots; Waders; Personal Flotation Device (if over or in water);

*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Prepare for site visit	1A) Slips, trips, falls	1A) Familiarize self with site prior to visit. ▪ Complete appropriate training before going on site. ▪ Provide appropriate person in district office your itinerary. ▪ Prepare listing of emergency phone numbers, both on and offsite. ▪ Identify site/activity PPE needs. ▪ Ensure that First Aid training is current, and that tetanus booster are current.
2. Check and calibrate sampling equipment.	2A) Muscle Strain - lifting, twisting, tugging	2A) Muscle Strain - lifting, twisting, tugging ▪ Inspect all PPE and equipment and ensure that it is working properly. ▪ Get assistance from a coworker or use mechanical means to move equipment (dolly, cart, etc.)
	2B) Slips, trips, falls, strain	2B) Slips, trips, and falls ▪ Wear proper footwear. ▪ Pay attention to where walking.
3. Load/carry equipment to the site.	3A) Slips, trips, falls,	3A) Slips, trips, falls ▪ See JHA for Mobilization / Demobilization and Site Preparation ▪ Survey and clear the pathway. See JHA for Clearing Brush and Trees
	3B) Muscle Strain - lifting, twisting, tugging	3B) Muscle Strain - lifting, twisting, tugging ▪ Proper lifting, ergonomic practices and body mechanics. ▪ Share the load, move items in smaller shifts, or use cart.
4. Field parameters	4A) Falling into water	4A) Falling into water ▪ Limit access to water. ▪ Use equipment that facilitates reaching the location from a safe distance. ▪ Work using the buddy system. Wear PFD if working over or in water.
	4B) Slips trips and falls	4B) Slips trips and falls ▪ Wear appropriate footwear. ▪ Survey and clear walking area. ▪ Do not walk on slippery surfaces. ▪ Housekeeping.
	4C) Stuck in the mud or sand	4C) Stuck in the mud or sand ▪ Ensure secure footing. ▪ Provide walkways, platforms or secure walking surface. ▪ Use the buddy system and maintain communications with support staff. ▪ (See JHA for Rescue from Mud footing)

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Job Hazard Analysis - HASP Format

Job Title: Pore Water Sampling from the Shore **Date of Analysis:** 4/4/07

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	4D) Vermin, leaches, Insect/animal born disease	4D) Vermin, leaches, Insect/animal born disease ▪ Survey the area for dens, nests, etc. ▪ Identify areas where biological hazards may be present. ▪ Be aware of your surroundings. ▪ Wear insect netting clothing or apply insect repellant on all exposed skin surfaces as appropriate – consider sample contamination ▪ Wear long sleeve shirt and full length pants ▪ Wear appropriate footwear (snake boots, etc.) ▪ Avoid high grass areas if possible ▪ Tuck pants leg into boot ▪ Do not put hand/arm into/under an area that you can not see into/under clearly ▪ Do not touch any suspected contaminant without appropriate hand PPE ▪ Wash hands as soon as possible upon completion of task. ▪ Perform routine inspections for ticks, leaches, etc. of yourself and co-workers. ▪ Contract vermin relocation, if applicable. ▪ Remain vigilant and respectful of wildlife. ▪ See JHA for Insects, Stings and Bites ▪ See JHA for Dog – Wildlife Safety.
	4E) Weather – temperature extremes	4E) Weather – temperature extremes ▪ Train workers about weather and appropriate precautions. ▪ Heat: o Familiarize self with signs of heat related illnesses: cramps, heat rash, dehydration, heat exhaustion, and heat stroke. ▪ Sun: o Keep body protected o Wear sunscreen, wide brimmed hat or hardhat. o Drink plenty of fluids to remain hydrated. o Schedule work for cool part of day. o Take breaks in the shade. ▪ Wind: o Wear layered clothing, gloves, hard hat with winter liner, etc. ▪ Cold: o During cold weather - layer clothing and wear wind impervious outerwear o During warm months – wear a long sleeve cotton/breathable fabric shirt and pant.
5. Sample collection	5A) Same as Item #4 above.	5A) Same as Item #4 above.
	5B) Bending, pulling, twisting	5B) Bending, pulling, twisting ▪ Use a vibrating or wiggling motion on the sample device to break the soil suction. ▪ Proper lifting technique.
	5C) Splash	5C) Splash ▪ Wear appropriate safety glasses (tinted for sun). ▪ Be aware if sampling water through a filter, if it becomes plugged with sediment it may unexpectedly “blow off” the hose and splash. ▪ Change filter prior to sedimentation back pressure.

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Job Hazard Analysis - HASP Format

Job Title: Pore Water Sampling from the Shore **Date of Analysis:** 4/4/07

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	5D) Chemical exposure	5D) Chemical exposure ▪ Wear PPE including protective gloves, coveralls, safety glasses as appropriate. ▪ Work upwind of the sample location. ▪ Minimize exposure using a shovel/spoon or tool to collect the sample. ▪ Review and understand MSDS for all chemicals being handled. ▪ Be careful when handling acids and caustic substances. ▪ Wear adequate PPE and wash hands after completion of task.
	5E) Vegetation, sticks, reeds, - cuts and punctures	5E) Vegetation, sticks, reeds, - cuts and punctures ▪ Clear access to site. ▪ Be familiar with toxic plants such as poison ivy. Avoid such plants. ▪ Wash thoroughly after accidental contact with toxic materials and plants.
6. Sample preparation.	6A) Lifting heavy objects (covers, pumps, sampling equipment, coolers, etc.) Muscle strain	6A) Lifting heavy objects (covers, pumps, sampling equipment, coolers, etc.) Muscle strain ▪ Use proper ergonomics when lifting heavy objects ▪ Use appropriate mechanical assistance and tools when possible.
	6B) Chemical Exposure	6B) Chemical Exposure ▪ Wear PPE including protective gloves, coveralls, safety glasses as appropriate. ▪ Wash/wipe or decontaminate exterior of sample containers and equipment. ▪ Use care handling preservatives (acids/bases.)
	6C) Sharps and knives	6C) Sharps and knives ▪ Use care handling tape dispensers, knives and sharp objects.
	6D) Extreme cold (ice preservation)	6D) Extreme cold (ice preservation) ▪ Minimize exposure to ice. ▪ Use a shovel/spoon or tool to fill bags for preserving samples in coolers.
7. Site exit and drive home or next site.	7A) Vehicle contamination	7A) Vehicle contamination ▪ Wash hands promptly. ▪ Contaminated PPE (booties, Tyvek, nitrile gloves) should be disposed on-site. ▪ Remove boots and soiled clothing for secure storage in trunk; decontaminate as soon as possible. ▪ Update exposure log.
	7B) Traffic hazards.	7B) Traffic hazards. ▪ See JHA for Mobilization / Demobilization and Site Preparation.

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Job Hazard Analysis - HASP Format

Job Title: Power Tools - Electrical **Date of Analysis:** 8/2/06

Minimum Recommended PPE*: Safety glasses, ear protection, dust mask or respirator,

*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Carrying tool to jobsite	1A) Back or muscle strain	1A) Back or muscle strain ▪ Use proper lifting techniques when tools or generators ▪ Use mechanical aids if available ▪ Use 2 person lift for heavy items
2. Setting up Work Area	2A) Injury due to encountering branches or debris	2A) Injury due to encountering branches or debris ▪ Inspect work area and clear away any loose wire, rope, branches or other items that may become entangled in tool or cutting head. ▪ Tool should be equipped with trigger style release switch.
	2B) Injury due to defective tool	2B) Injury due to defective tool ▪ Inspect tool prior to use to ensure it is safe to use. ▪ If found to be defective or if questionable condition, do not use the tool until serviced. Tag tool out of service
3. Using tool – Electric Saws	3A) Inexperience	3A) Inexperience ▪ Train all hand tool users in their proper use. ▪ Never allow workers to work alone until they have demonstrated an ability to handle the tool safely.
	3B) Electrical shock	3B) Electrical shock ▪ Make sure that tool is in good condition, cord is not frayed or pulling away from the plug or connection. ▪ Do not remove grounding plug or use a tool where the grounding plug has been removed ▪ Avoid working in wet areas. ▪ Ground tools when using generators. ▪ Use a GFCI ▪ Keep tools unplugged when not in use.
	3C) Cuts	3C) Cuts ▪ All electric power tools should be unplugged when changing bits, making adjustments, or changing blades. ▪ Guards must remain in place and not "pinned" back. ▪ Push sticks should be used when using jointer or ripping with table saw. ▪ Keep fingers away from cutting blades. ▪ Clamp small stock when using router, drill, saw, or sander. ▪ Check blades regularly and keep in good condition. ▪ Use blade recommended for material being cut. ▪ Never jam saw into work. ▪ Cut green, treated or wet material slowly and with caution
	3D) Ear injury	3D) Ear injury ▪ Wear ear protection if required.
	3E) Eye injury	3E) Eye injury ▪ Safety goggles (or protective glasses) should be worn at all times. ▪ Look for nails or hard knots before cutting.
	3F) Entanglement (clothing or cords)	3F) Entanglement (clothing or cords) ▪ Secure all loose clothing and long hair. ▪ Be aware of cord locations and keep away from drill, saw, or sander. ▪ Keep chuck key clear of drill or saw before plugging in. ▪ Electrical hand saws and drills must have quick release trigger.

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Job Hazard Analysis - HASP Format

Job Title: Power Tools - Electrical **Date of Analysis:** 8/2/06

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	3G) Electrical grinders	3G) Electrical grinders ▪ Check grinding wheels often. ▪ Do not grind soft material. ▪ Hold small objects with clamp or vise grip.
	3H) Electrical saws (dust)	3H) Electrical saws (dust) ▪ Operators exposed to dust, as when cutting concrete, tile, treated wood or stone, shall wear approved respirator (mask).
	3I) Electrical drills	3I) Electrical drills ▪ Inspect drill bits regularly and use the recommended bit for material being drilled.
	3J) Electrical sanders	3J) Electrical sanders ▪ Inspect sanding surface for nails. ▪ Check sandpaper often. Keep belt centered on belt sander. ▪ Do not sand wet material.

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Job Hazard Analysis - HASP Format

Job Title: Streams and Wetlands **Date of Analysis:** 5/30/06

Minimum Recommended PPE*:
*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Walking to and from stream	1A) Insect bites/stings	2A) Insect bites/stings ▪ Avoid wearing heavy fragrances. ▪ Carry first-aid and sting relief kits. ▪ Make sure all crew members are informed about others who are allergic and what to do if they need assistance. ▪ Carry necessary emergency medication. ▪ See JHA Insect Bites and Stings
	1B) Slips and falls	2B) Slips and falls ▪ Use traction devices on shoes. ▪ Move slowly, take your time. ▪ Use a walking staff to provide a three point support.
	1C) Eye injuries	2C) Eye injuries ▪ Travel with care through heavy brush. ▪ Use eye protection in brushy areas.
	1D) Scrapes and punctures	2D) Scrapes and punctures ▪ Wear proper clothing, long sleeved shirts and pants. No shorts.
	1E) Cuts/Lacerations due to machette use	2E) Cuts/Lacerations due to machette use ▪ Wear chaps or snake legs ▪ Cut away from the body ▪ Ensure blade of machette is sharp
	1F) Blow-down / heavy debris	2F) Blow-down / heavy debris ▪ Be aware of your surroundings, including hanging or leaning debris that may be dislodged and fall.
	1G) Animal encounters	2G) Animal encounters ▪ Moose: a. Make noise to avoid encounter. b. If you do encounter a moose, put a lot of room between you and the animal by walking around him/her if necessary. c. Do not look it in the eye. d. If charged, run away or climb a tree. e. Throwing something or shouting may deter an attack.
	1H) Severe injury in remote locations	2H) Severe injury in remote locations ▪ Carry a two-way radio and know how to use it. ▪ Work in teams. ▪ Make sure someone on crew is certified in first aid. ▪ Carry a first aid kit.
2. Entering Stream	2A) Slips and falls	2A) Slips and falls ▪ Use traction devices on shoes and waders. ▪ Move slowly, take your time. ▪ Use a walking staff to provide a three point support.
	2B) Sand or Mud – knee or ankle injury	2B) Sand or Mud ▪ Use shorter steps ▪ Use walking sticks to check firmness of soils ▪ Use buddy system ▪ Snowshoes that dissipate weight may be effective ▪ If leg gets caught, use slight back and forth motion to soften mud and remove slowly. Don't try to pull leg out with twisting or jerking motion. ▪ If possible, aeriate or bubble the mud to help releave suction.

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Job Hazard Analysis - HASP Format

Job Title: Streams and Wetlands **Date of Analysis:** 5/30/06

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	2C) Equipment	2C) Equipment ▪ Secure packs and hip waders with quick release straps and be ready to discard, if an emergency arises. ▪ Do not work in waders in water greater than 3 feet deep or in swift water. ▪ Wear bike or rafting helmets to protect from blows to the head.
	2D) Hypothermia	2D) Hypothermia ▪ Work in teams of two. ▪ Have warming devices available. ▪ Wear proper equipment that is in good condition. ▪ Be aware of signs of hypothermia, it's prevention, detection and treatment. ▪ Stay in tune to current weather and extended forecasts. ▪ See JHA General Field Work
	2E) High flow velocity	2E) High flow velocity ▪ Evaluate a stream before entering. ▪ Follow the "rule of 10" a. If stream is 1 foot deep and flowing @10 ft./sec, it is too hazardous to wade b. If stream is 2 feet deep and flowing at 5 ft./second, it is too hazardous to wade. c. If you do enter a stream and discover it is too dangerous to wade, back out using your wading pole for balance.
	2F) Severe weather	2F) Severe weather ▪ Suspend measurements during lightning storms or when a storm is approaching.

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Job Hazard Analysis - HASP Format

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

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

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

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Job Hazard Analysis - HASP Format

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

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

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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.

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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
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.

MACTEC

Job Hazard Analysis - Short Form HASP

Job Title: Working in Muddy Areas **Date of Analysis:** 9/26/06

Minimum Recommended PPE*: Modified Level D – field clothing, boots
*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Prepare for site visit	1A) See JHA Mobilization/ demobilization/site preparation	1A) See JHA Mobilization/ demobilization/site preparation
2. Traveling/working in areas with potential muddy locations – Example outdoor surface water areas.	2A) Poor footing - sip, suction, entrapment or fall.	2A) Poor footing - slip, suction, entrapment or fall. ▪ Use a walking stick or probe to check footing and potietial deep holes prior to entering area. ▪ Wear appropriate foot wear such as boots. Over shoe boots provide protection to foot wear as well as a layer to remove if foot gets stuck. ▪ Be aware of surroundings. Avoid muddy areas if possible. ▪ Use the buddy system. Keep a safe distance between workers to avoid both workers getting stuck. ▪ Be prepared with rope, plywood, shovel, pole to assist "rescue" from being stuck in the mud. ▪ If walking in mud is required to reach sample area, several techniques may be employeed to limit foot suction and sinking in mud or quicksand. - Provide a walkway or elevated surface. - Use of snow fencing on the surface or snow shoes to disperse your weight. - Use a skating motion and keep moving until on location. Use a platform to stand on for sampling. - Use coolers or other means of support while walking across muddy area.
3.	3A) Allergic reactions, painful stings	3A) Allergic reactions, painful stings ▪ Be alert to hives in brush or in hollow logs. Watch for insects travelling in and out of one location. ▪ See JHA – Insect bites and stings.
4. .	4A) Skin irritation, encephalitis	4A) Skin irritation, encephalitis ▪ Wear long sleeves and trousers.

MACTEC

Job Hazard Analysis - HASP Format

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

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

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

APPENDIX C

COMMUNITY PARTICIPATION PLAN (CPP)

COMMUNITY PARTICIPATION PLAN
BRAM MANUFACTURING

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

1.0 INTRODUCTION

A major goal of citizen participation (CP) is to foster communication and trust between the public and the NYSDEC in the effort to restore and maintain the environment and protect public health. Citizen participation also provides opportunities to gather the public's knowledge and information. This input will be needed to make informed decisions about the Remedial investigation (RI) to be conducted at the Bram Manufacturing site, and the proposed remedial actions that may follow. Effective public input will help residents in the Congers area and the NYSDEC to develop and implement a plan for Site restoration that is environmentally sound and that has public acceptance and high probability of timely implementation.

This Citizen Participation (CP) plan identifies the CP activities to be conducted during the RI at the Erdle Perforating site. A glossary of terms associated with New York's hazardous waste site citizen participation program is attached as Appendix A.

2.0 SITE BACKGROUND

The Site is located at 26 Route 9W in the Town of Congers, Rockland County. It is identified on the town of Clarkstown tax map as Section 141, Block A, Lot 8. The site is located on Route 9W and is within 200 feet of the Kill Von Beaste which connects Swartwout Lake with Rockland Lake, and consists of an open lot and contains a one story 12,300 square foot block construction building. The site is currently used as both office space and storage. The previous occupant was a manufacturer of lighting fixtures. The property is bordered immediately to the north by a Motel (Holiday Court); to the east by a storage facility, a stream (Kill Von Beaste), and a wetland; to the south by a commercial, property and to the west by Route 9W. Residences are located further to the north and on the west side of Route 9W. The prior uses that appear to have led to contamination include the manufacturing of lighting fixtures and possible disposal of waste products.

Historical data reviewed indicates that chlorinated solvents have migrating into soil, bedrock, and groundwater as a result of previous at the Site. Aromatic hydrocarbons have also migrated into soil, bedrock, and groundwater as a result of a gasoline UST leak in a presumed upgradient location form the Site. Groundwater is present at approximately four to feet bgs. Groundwater reportedly flows to the northeast in overburden; however groundwater flow direction(s) in bedrock (present at approximately 7 to 10 feet bgs) need to be determined.

Existing data indicate that groundwater contains concentrations of chlorinated solvents and aromatic hydrocarbons above applicable standards, criteria and guidance values (SCGs). Previous investigations did not fully define the extent of groundwater, soil, and potentially surface water, sediment, and indoor air contamination.

3.0 PROJECT DESCRIPTION

This section describes the objectives of the Bram Manufacturing RI and presents a summary of proposed investigation tasks.

3.1 PROJECT OBJECTIVES

To evaluate the potential threat to human health and the environment, and to collect data for the future evaluate of remedial alternatives for the Site, field investigations are planned. These activities will evaluate soil, bedrock, groundwater, sediment and surface water, and soil vapor conditions at and downgradient of the Site. Specifically, data collection is necessary to complete the following:

- Evaluate source area soil (if encountered)/bedrock to determine if residual contamination still exists on the Site.
- Define the areal and vertical extent of contaminants in area groundwater, as well as evaluate groundwater flow direction and rate.
- Evaluate potential contaminant discharge to the adjacent steam at the Site and collect surface water and sediment samples.
- Collect commercial and residential sub-slab vapor and indoor air samples to determine if soil vapor migration is occurring and which direction(s).
- Evaluate present and future human health exposure pathways, such as through exposure to site source materials, groundwater, and/or vapor migration to indoor air.
- Evaluate the actual or potential impacts to fish and wildlife resources.

3.2 FIELD PROGRAM SAMPLING ACTIVITIES

To accomplish the project objectives noted above, field data gathering will be necessary. Currently, the field program is anticipated to include the following:

- Perform borehole geophysics and passive diffusion sampling for VOCs (up to four samples) in the inactive water supply well.
- Collect 13 sub slab vapor samples from the Site building and adjacent commercial buildings.

- Install seven overburden wells and five bedrock monitoring wells. Five of the overburden wells will be paired with a bedrock well.
- Collect groundwater samples from the 12 new wells for VOC, SVOC, TAL metals analyses, plus a subset for pesticides and polychlorinated biphenyls (PCB).
- Collect a soil sample from each of the overburden monitoring wells for VOC, SVOC, TAL metals analyses, plus a subset for pesticides and polychlorinated biphenyls (PCB).
- Collect six surface water and sediment samples from selected catch basins in the storm drain system at the Site and at two locations (one upgradient and on down gradient) in the stream adjacent to the site (Kill Von Beaste) for VOC, SVOC, TAL metals, and pesticide/PCB analyses
- Collect five background soil samples for TAL metals analysis.
- Collect indoor air/ambient and sub-slab samples from up to 10 residences in the Hidden Valley Development.

Upon completion of the field investigations and receipt of analytical data, an RI Report will be prepared. The RI Report will include a summary of the Site background and history including results of investigations conducted prior to the RI. The RI Report will summarize results of the field investigations and laboratory analytical activities performed during field work. The information provided in the RI Report will be used to allow the NYSDEC to prepare a Feasibility Study (FS) to evaluate remedial alternatives for the Site.

3.3 FEASIBILITY STUDY

Upon completion of the RI, a FS will be completed to evaluate the most applicable remedial alternatives. Prior to proposing a remedy for the Site, Remedial Action Objectives will be developed. The proposed remedy for the Site will be aimed at restoring the Site to pre-release conditions, or, at a minimum, eliminating or mitigating all significant threats to public and health and the environment posed by the contaminants. Scientific and engineering principles will be applied to determine the most appropriate remedy for the Site, with the goal of protecting public health and the environment and complying with the state Standards, Criteria and Guidance Values. The proposed remedial action will be based on the criteria outlined in 6 NYCRR 375.

3.4 PROJECT SCHEDULE

Field investigations and laboratory analysis will require approximately 7 months to complete. A Draft RI Report will be submitted to the NYSDEC for review in the Winter of 2008.

4.0 CITIZEN PARTICIPATION ACTIVITIES

This section of the CP Plan lists the CP activities to be conducted during the RI. The CP activities include, but are not limited to the following:

- Develop, maintain, and update a project contact list,
- Establish document repositories (documents will be sent to these locations for public review; the documents include work plans, RI report, and fact sheets),
- Schedule public meetings (will include an optional meeting during the RI and a meeting after the RI is completed),
- Prepare fact sheets (announcing results of RI) will be prepared and distributed as necessary,
- Schedule availability sessions may be held as necessary to keep public apprised of project status, and
- Release of reports (including RI Report).

5.0 PROJECT CONTACTS

For additional information about the program to remediate the Bram Manufacturing Site, the public is encouraged to contact any of the project staff listed below.

Technical Information:

Randy Whitcher
NYSDEC
Div. of Environ. Remediation
625 Broadway, 11th Floor
Albany, NY 12233-7014
(518) 402-9662

Health-Related Information:

Nathan Walz
NYS Department of Health
Bureau of Environmental Exposure Investigation
547 River Street
Troy, NY 12180-2216
1-800-458-1158 ext. 27880

Citizen Participation:

Michael Knipfing
NYSDEC - Region 3
21 S. Putt Corners Rd
New Paltz, NY 12561
(845) 256-3154

6.0 DOCUMENT REPOSITORIES AND LIST OF AVAILABLE DOCUMENTS

Three document repositories have been established to provide the public with convenient access to important project documents and other information. This information will include reports, data and information gathered and developed during the course of the Site Investigation and Remedial Closure.

Valley Cottage Library
110 Route 303
Valley Cottage, NY 10989
(845) 268-7700
Contact: Christy Blanchette
Hours: M-Thur: 10am-9pm
Fri., Sat: 10am-5pm

NYSDEC Region 3 Office
21 S. Putt Corners Rd
New Paltz, NY 12561
Contact: Michael Knipfing
(845) 256-3154
Hours: Mon.- Fri. 8:30am - 4:45 pm

NYSDEC Central Office
Remedial Bureau C
625 Broadway, 11th Floor
Albany, NY 12233-7014
Contact: Randy Whitcher
(518) 402-9662
Hours: Mon.- Fri. 8:00 am - 4:00 pm

Available Documents

- Phase I Preliminary Site Assessment Report Bram Manufacturing, dated October, 1998
- Subsurface Investigation Report Bram Manufacturing Corporation, dated January, 1999
- Citizen Participation Plan for the Bram Manufacturing Site
- Fact Sheet Bram Manufacturing, dated April, 2008

7.0 PUBLIC CONTACT LIST

The following contact list has been developed to help the DEC keep the community informed about and involved in the RI/FS process for the Site. The list includes adjacent property owners; local, regional and state officials; local media; civic, business and environmental organizations; and others. The contact list will be reviewed periodically and updated as appropriate.

Note: The adjacent/affected property owner and resident portion of the list is maintained confidentially in project files, not in a CP Plan or repositories.

Scenic Hudson
1 Civic Center Plaza
Poughkeepsie, NY 12601

Greenway Conservancy
Capitol Building
Capitol Station, Rm 254
Albany, NY12224

The Nature Conservancy
Eastern NY Chapter
265 Chestnut Hill Rd
Mt. Kisco, NY 10549

Karl Coplan, Esq.
Pace/Riverkeeper
78 N. Broadway
White Plains, NY 10603

Environmental Citizens Coalition
119 Washington Ave Suite #3
Albany, NY 12210

Laura Haight
NYPIRG
107 Washington Ave.
Albany, NY 12210

Rockland County EMC
50 Sanatarium Road
Building P
Pomona, NY 10970

Rockland County Health Dept.
Attn: Thomas Micelli, PE
Building D
Sanatarium Road
Pomona, NY 10970

Rockland County Conservation Association
P.O. Box 213
Pomona, NY 10970

Larry Larson
Natural Resource Conservation Service
225 Dolson Avenue, Suite 103
Middletown, NY 10940

Cornell Cooperative Extension Service
c/o 10 Patriot Hills Drive
Stony Point, NY 10980

Sierra Club
Atlantic Chapter
353 Hamilton Street
Albany, NY 12210

Media

City Editor
Hudson Valley Business Journal
86 E. Main st
Wappingers Falls, NY 12590

City Editor
El Clarin
48 Broadway
Haverstraw, NY 10927

City Editor
Journal News
200 North Rte. 303
West Nyack, NY 10994

City Editor
OurTown/ Courier/ Independent
36 Ridge
Pearl River, NY 10965

City Editor
Rockland Review
26 Snake Hill Rd.
West Nyack, NY 10994

City Editor
Rockland County Times
119 Main St.
Nanuet, NY 10954

City Editor, The Jewish Tribune
Executive Office
78 Randall Avenue
Rockville Center, NY 11570

City Editor
The Record
150 River Street
Hackensack, NJ 07601

WNYK
Nyack College
Nyack, NY 10960

News Director
WRKL
1551 Route 202
Pomona, NY 10970

News Director
Cablevision
235 W. Nyack Road
W. Nyack, NY 10994

News Director, MediaOne
N. Rockland High School
Hammond Road
Theills, NY 10984

News Director
WRNN TV
721 Broadway
Kingston, NY 12401

Lisa Phillips, Bureau Chief
WAMC
44 Main Street
Kingston, NY 12401

Hank Gross
Mid-Hudson News Service
42 Marcy Lane
Middletown, NY 10941

News Director
women's e news
395 Hudson Street
New York, NY 10014

News Director
WTBQ
62 N. Main St.
Florida, NY 10921

News Director
WRCR
75 West Rt. 59, Suite 2126
Nanuet, NY 10954

Local Officials

Alexander J. Gromack
Town of Clarkstown Supervisor
10 Maple Avenue
New City, NY 10956

David Carlucci
Town of Clarkstown Clerk
10 Maple Avenue
New City, NY 10956

John R. Maloney
Town Board, Deputy Supervisor
10 Maple Avenue
New City, NY 10956

Ralph F. Mandia
Town Board
10 Maple Avenue
New City, NY 10956

Shirley Lasker
Town Board
10 Maple Avenue
New City, NY 10956

Catherine M. Nowicki
Town Board
10 Maple Avenue
New City, NY 10956

K. Luke Kalarickal, P.E.
Environmental Control
10 Maple Avenue
New City, NY 10956

Peter J. Beary - Building Inspector
Building Department
10 Maple Avenue
New City, NY 10956

Shirley J. Thormann - Chairperson
Planning Board
10 Maple Avenue
New City, NY 10956

County Officials

C. Scott Vanderhoef
County Executive
Office of the County Executive
11 New Hempstead Road
New City, NY 10956

Paul Piperato, County Clerk
Office of the Rockland County Clerk
Rockland County Courthouse
1 South Main Street, Suite 100
New City, NY 10956

R. Allan Beers
Coordinator of Environmental Resources
The Dr. Robert L. Yeager Health Center
50 Sanatorium Road
Pomona, NY 10970

Dr. Joan Facelle, MD, MPH
Commissioner of Health
The Dr. Robert L. Yeager Health Center
Building D
50 Sanatorium Road
Pomona, NY 10970

Dr. Dan Miller, Ph.D.
Rockland County Department of Health
The Dr. Robert L. Yeager Health Center
Building D
50 Sanatorium Road
Pomona, NY 10970

Catherine Quinn
Rockland County Department of Health
The Dr. Robert L. Yeager Health Center
Building D
50 Sanatorium Road
Pomona, NY 10970

Honorable Theodore Dusanenko
County Legislator
Allison-Parris County Office Building
11 New Hempstead Road
New City, NY 10956

Honorable Harriet D. Cornell
Chairwoman, Rockland County Legislature
Allison-Parris County Office Building
11 New Hempstead Road
New City, NY 10956

Laurence O. Toole, Clerk
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11 New Hempstead Road
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State Officials

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Albany, NY 12233

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100 Hillside Ave., Suite 1 W
White Plains, NY 10603

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NYSDEC
21 South Putt Corners Road
New Paltz, NY 12561

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NYSDEC
21 South Putt Corners Road
New Paltz, NY 12561

Richard W. Baldwin, P.E.
Regional Engineer
NYSDEC Region 3
21 South Putt Corners Road
New Paltz, NY 12561-1620

Nathan Walz
NYS Department of Health
Bureau of Environ. Exposure Investigation
547 River Street
Troy, NY 12180-2216

Gary Litwin
NYS Department of Health
Bureau of Environ. Exposure Investigation
547 River Street
Troy, NY 12180-2216

Mike Rivara
NYS Department of Health
Bureau of Environmental Exposure Investigation
547 River Street
Troy, NY 12180-2216

State Elected Officials

Honorable Thomas P. Morahan
158 Airport Executive Park
Nanuet, NY 10954

Honorable Kenneth Zebrowski, Jr.
NY State Assembly District 94
Legislative Office Building
Albany, NY 12248

Federal Elected Officials

Honorable Charles Schumer
313 Hart Senate Building
Washington, DC 20510

Honorable Hillary Rodham Clinton
United States Senate
476 Russell Senate Office Building
Washington, DC 20510

Honorable Nita Lowey
222 Mamaroneck Ave.
Suite 310
White Plains, NY 10605

Other Interested Parties

Tzetzoainee Motel Reality Inc.
8 Morris Rd.
Valley Spring, NY 10977

Rocco Dimatteo
49 Rolling Ridge Rd.
New City, NY 10956

Snow Church Reality Corp.
26 Elmsford Rd.
New City, NY 10956

Route 9W LLC
3 Daken Ct.
Valley Cottage, NY 10989

Bridgewater 11 Homeowner Ass. Inc.
33 Patricks Pl.
Congers, NY 10920

Christy Blanchette
Valley Cottage Library
110 Route 303
Valley Cottage, NY 10989

APPENDIX A
TO APPENDIX C

HAZARDOUS WASTE SITE PROGRAM GLOSSARY AND ACRONYMS

SOURCE:

Citizen Participation in New York's Hazardous Waste Site Remediation Program:

A GUIDEBOOK

June 1998

New York State Department of Environmental Conservation Division of Environmental Remediation

Appendix

Hazardous Waste Site Program Glossary and Acronyms

GLOSSARY

This glossary defines terms associated with New York's hazardous waste site citizen participation program, and important elements of the hazardous waste site remedial program. Words in **bold** in the definitions are defined elsewhere in the glossary. A list of acronyms often used in the remedial program begins on page D-7.

Administrative Record — Part of a site's **Record of Decision** which lists and defines documents used in the development of NYSDEC's decision about selection of a remedial action.

Availability Session — A scheduled gathering of program staff and members of the public in a casual setting, without a formal presentation or agenda but usually focusing on a specific aspect of a site's remedial process.

Citizen Participation — A program of planning and activities to encourage communication among people affected by or interested in hazardous waste sites and the government agencies responsible for investigating and remediating them.

Citizen Participation Plan — A document which must be developed at a site's **Remedial Investigation** stage. A CP Plan describes the citizen participation activities that will be conducted during a site's remedial process.

Citizen Participation Record — A document prepared at a major remedial stage which describes the citizen participation activities required at that stage. A CP Record also directs a scoping process to determine if additional citizen participation activities are appropriate and feasible.

Citizen Participation Specialist

A staff member from an NYSDEC central office or regional office who has specialized training and experience to assist a **project manager** and other staff to plan, conduct and evaluate a site-specific citizen participation program.

Classification

A process to place a hazardous waste site within a category which defines its hazardous waste status and its threat or potential threat to public health and the environment. Sites are listed along with their classifications in the **Registry of Inactive Hazardous Waste Disposal Sites.**

Class 1 - causing or representing an imminent danger of causing irreversible or irreparable damage to public health or environment -- immediate action required.
Class 2 - significant threat to public health or environment -- action required.
Class 2a - temporary classification assigned to a site for which there is inadequate or insufficient data for inclusion in any other classification.
Class 3 - does not present a significant threat to public health or environment -- action may be deferred.
Class 4 - site properly closed -- requires continued management.
Class 5 - site properly closed -- no further action required.
Delisted - site no longer considered an inactive hazardous waste disposal site.

Comment Period

A time period for the public to review and comment about various documents and DER actions. For example, a 30-day comment period is provided when DER issues a **Proposed Remedial Action Plan (PRAP)**, and when DER proposes to **Delist** a site from the **Registry of Inactive Hazardous Waste Disposal Sites.**

Consent Order

A legal and enforceable agreement negotiated between NYSDEC and a **responsible party**. The order sets forth agreed upon terms by which a responsible party will undertake site investigation and/or cleanup, or pay for the costs of those activities. The order includes a description of the remedial actions to be taken by the responsible party with NYSDEC oversight, and a schedule for implementation.

Contact List — Names, addresses and/or telephone numbers of individuals, groups, organizations, government officials and media affected by or interested in a particular hazardous waste site. The size of a contact list and the categories included are influenced by population density, degree of interest in a site, the stage of the remedial process and other factors. It is an important tool needed to conduct outreach activities.

Delist — Action by which DER removes a hazardous waste site from the **Registry of Inactive Hazardous Waste Disposal Sites** upon determination that: the site contains inconsequential amounts of hazardous waste; or that a remediated site no longer requires **Operation and Maintenance;** or that a remediated site does not require Operation and Maintenance. A proposal to delist a site triggers a public notification and **comment period** process.

Division of Environmental Enforcement (DEE) — A unit within the New York State Department of Environmental Conservation which works with the **Division of Environmental Remediation** and others to negotiate with **responsible parties** to achieve agreements for the investigation and remediation of hazardous waste sites. A negotiated agreement is contained in a **consent order.**

Division of Environmental Remediation — Formerly the **Division of Hazardous Waste Remediation,** a major program unit within the New York State Department of Environmental Conservation created to manage the hazardous waste site remedial program from site discovery through **Operation and Maintenance** activities. Staff include: engineers, geologists, chemists, attorneys, citizen participation specialists, environmental program specialists and support staff.

Division of Hazardous Waste Remediation — (See **Division of Environmental Remediation**

Document Repository — A file of documents pertaining to a site's remedial and citizen participation programs which is made available for public review. The file generally is maintained in a public building near the hazardous waste site to provide access at times and a location convenient to the public.

Enforcement — NYSDEC's efforts, through legal action if necessary, to compel a **responsible party** to perform or pay for site remedial activities. NYSDEC may perform this effort by itself or in concert with other agencies.

Environmental Quality Bond Act (EQBA) — The 1986 Environmental Quality Bond Act which gives New York State bonding authority of up to $1.2 billion to fund the State's share of the total cost of remediating hazardous waste sites in New York State.

Fact Sheet — A written discussion about part or all of a site's remedial process, prepared and provided by DER to the public. A fact sheet may focus on: a particular element of the site's remedial program; opportunities for public involvement; availability of a report or other information, or announcement of a **public meeting** or **comment period**. A fact sheet may be mailed to all or part of a site's **contact list**, distributed at meetings, placed in a **document repository** and/or sent on an "as requested" basis.

Interim Remedial Measure (IRM) — A discrete action which can be conducted at a site relatively quickly to reduce the risk to people's health and the environment from a well-defined hazardous waste problem. An IRM can involve removing contaminated soil and drums, providing alternative water supplies or securing a site to prevent access.

National Priorities List — The U.S. Environmental Protection Agency's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial response using money from a special trust fund.

New York State Department of Health — Agency within the executive branch of New York State government which: performs health-related inspections at suspected hazardous waste sites; conducts health assessments to determine potential risk from environmental exposure; reviews Risk Assessments prepared during the **Remedial Investigation and Feasibility Study**; conducts health-related community outreach around sites; and reviews remedial actions to assure that public health concerns are adequately addressed.

New York State Department of Law — Agency within the executive branch of New York State government which takes the lead on hazardous waste sites requiring civil enforcement through court action. Litigation can involve negotiations and court action with **responsible parties** to clean up sites; natural resource damage claims, and recovery of remedial costs.

New York State Registry of Inactive Hazardous Waste Disposal Sites

The "Registry." A document which NYSDEC is directed by law to maintain and which lists and provides information about every hazardous waste site in New York State which meets criteria established through a definition of hazardous waste and a **classification** system.

Operable Unit

A discrete part of an entire site that produces a release, threat of release, or pathway of exposure. An Operable Unit can receive specific investigation, and a particular remedy may be proposed. A **Record of Decision** is prepared for each Operable Unit.

Operation and Maintenance

A period in which remedial action may be conducted following construction at a site (for example, operation of a "pump and treat" system), or which is performed after a remedial action to assure its continued effectiveness and protection of people's health and the environment. Activities can include site inspections, well monitoring and other sampling.

Preliminary Site Assessment (PSA)

A PSA is DER's first investigation of a site. A PSA is performed to determine if a site meets New York State's definition of an inactive hazardous waste disposal site by confirming the presence of hazardous waste and determining if the site poses a significant threat to public health or the environment.

Project Manager

An NYSDEC staff member within the **Division of Environmental Remediation** (usually an engineer, geologist or hydro geologist) responsible for the day-to-day administration of remedial activities at, and ultimate disposition of, a hazardous waste site. The Project Manager works with legal, health, **citizen participation** and other staff to accomplish site-related goals and objectives.

Proposed Remedial Action Plan (PRAP)

An analysis by DER of each alternative considered for the remediation of a hazardous waste site and a rationale for selection of the alternative it recommends. The PRAP is created based on information developed during the site's **Remedial Investigation and Feasibility Study**. The PRAP is reviewed by the public and other state agencies.

Public Meeting — A scheduled gathering of **Division of Environmental Remediation** staff with the affected/interested public to give and receive information, ask questions and discuss concerns about a site's remedial program. Staff from other NYSDEC divisions, legal and health staff, and staff from consultants and a responsible party often also attend. A public meeting, unlike an **availability session**, generally features a formal presentation and a detailed agenda.

Reclassification — A process by which DER redefines the threat posed by a hazardous waste site to public health and the environment by developing and assessing site information and, based on findings and conclusions, assigning a new **classification** code.

Record of Decision (ROD) — A document which provides definitive record of the cleanup alternative that will be used to remediate a hazardous waste site. The ROD is based on information and analyses developed during the **Remedial Investigation/Feasibility Study** and public comment.

Remedial Construction — The physical development, assembly and implementation of the remedial alternative selected to remediate a site. Construction follows the **Remedial Design** stage of a site's remedial program.

Remedial Design — The process following finalization of a **Record of Decision** in which plans and specifications are developed for the **Remedial Construction** of the alternative selected to remediate a site.

Remedial Investigation/ Feasibility Study (RI/FS) — The RI fully defines and characterizes the type and extent of hazardous waste contamination at the site. The FS, which may be conducted during or after the RI, uses information developed during the RI to develop alternative remedial actions to eliminate or reduce the threat of hazardous waste contamination to public health and the environment.

Responsible Party — An individual or business who: currently owns or operates a hazardous waste site; or historically owned or operated a site when hazardous waste was disposed; or generated hazardous waste at a site; or transported hazardous waste to a site.

Responsiveness Summary — A written summary of major oral and written comments received by DER during a **comment period** about key elements of a site's remedial program, such as a **Proposed Remedial Action Plan**, and DER's response to those comments.

Site Issues and Community Profile Scoping Sheet — A document prepared to support each **Citizen Participation Record**. Each Scoping Sheet identifies issues and information important to DER and the community and information that needs to be exchanged at a particular remedial stage. The Scoping Sheet also summarizes information about the surrounding community, including demographics, special needs, etc.

Superfund — The common name for the Federal program established by the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended in 1986. The Superfund law authorizes the U.S. Environmental Protection Agency to investigate and clean up sites nominated to the **National Priorities List**.

Title 3 Project — Remediation of a municipally owned site through the State Superfund Title 3 Program whereby New York State pays 75 percent of eligible costs for remediation and the municipality pays 25 percent.

Toll-Free "800" Number — An information line maintained by the **Division of Environmental Remediation** to provide convenient access for people who have questions, concerns or information about hazardous waste sites and their remedial programs.

ACRONYMS

AG -- New York State Attorney General's Office
ARAR -- Applicable, Relevant and Appropriate Requirement
C & D -- Construction and Debris
CERCLA -- Comprehensive Environmental Response, Compensation and Liability Act of 1980
CO -- Consent Order
CP -- Citizen Participation
CPP -- Citizen Participation Plan
CPS -- Citizen Participation Specialist
CQC/CQA -- Construction Quality Control/Construction Quality Assurance
DEE -- Division of Environmental Enforcement
DER -- Division of Environmental Remediation, formerly the Division of Hazardous Waste Remediation
DHWR -- Division of Hazardous Waste Remediation, now the Division of Environmental Remediation
DOD -- Department of Defense
DOL -- Department of Law
DOW -- Division of Water
ENB -- Environmental Notice Bulletin

EQBA	--	1986 Environmental Quality Bond Act
EPA	--	Environmental Protection Agency
F & W	--	Division of Fish and Wildlife
FDA	--	Food and Drug Administration
FSF	--	Federal Superfund
FOIL	--	Freedom of Information Law
FS	--	Feasibility Study
FY	--	Fiscal Year
GPM	--	Gallons Per Minute
HeLP	--	Health Liaison Program
IRM	--	Interim Remedial Measure
mg/kg	--	milligrams per kilogram
NAPL	--	Non-Aqueous Phase Liquid
NPL	--	National Priorities List
NYSDEC	--	New York State Department of Environmental Conservation
NYSDOH	--	New York State Department of Health
O & M	--	Operation and Maintenance
OSHA	--	Occupational Safety and Health Administration
OU	--	Operable Unit
PAH	--	Poly-Aromatic Hydrocarbon
PCB	--	Poly-Chlorinated Biphenyl
PM	--	Project Manager
ppm/ppb/ppt	--	parts per million/parts per billion/parts per trillion
PRAP	--	Proposed Remedial Action Plan
PRP	--	Potentially Responsible Party
PRS	--	Priority Ranking System
PSA	--	Preliminary Site Assessment
QA/QC	--	Quality Assurance/Quality Control
RA	--	Remedial Action
RCRA	--	Resource Conservation and Recovery Act
RD	--	Remedial Design
RFP	--	Request for Proposals
RHWRE	--	Regional Hazardous Waste Remediation Engineer
RI	--	Remedial Investigation
RI/FS	--	Remedial Investigation/Feasibility Study
ROD	--	Record of Decision
RP	--	Responsible Party
SSF	--	State Superfund
TAGM	--	Technical and Administrative Guidance Memorandum
TCLP	--	Toxicity Characteristic Leaching Procedure
TSDF	--	Treatment, Storage and Disposal Facility
ug/l	--	micrograms per liter
USGS	--	U.S. Geological Service
VCP	--	Voluntary Cleanup Program
VOC	--	Volatile Organic Compound

APPENDIX D

COST TABLES

(Provided under separate cover)