FINAL
SITE CHARACTERIZATION WORK PLAN
SARANAC LAKE GAS COMPANY SITE
SARANAC LAKE, NEW YORK

SITE NO. 516008

WORK ASSIGNMENT NO. D004434-6

Prepared for:

New York State Department of Environmental Conservation

Ray Brook, New York

Prepared by:

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

Project Number: 3612062058

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ACRONYMS

ASP	Analytical Services Protocols
bgs	below ground surface
CN	cyanide
DQO	Data Quality Objective
DUSR	Data Usability Summary Report
^{o}F	degrees Fahrenheit
GPS	ground positioning satellite
GS	Geoprobe® Soil
GW	Geoprobe® Water
HASP	Health and Safety Plan
IDW	investigation-derived waste
MACTEC	MACTEC Engineering and Consulting, P.C.
MGP	manufactured gas plant
msl	mean sea level
NGVD	National Geodetic Vertical Datum
NYCRR	New York Codes, Rules, and Regulations
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
PID	photoionization detector
ppm	parts per million
PVC	polyvinyl chloride
QA	Quality Assurance
QAPP	Quality Assurance Program Plan
QAPjP	Quality Assurance Project Plan
QC	Quality Control
RCRA	Resource Conservation and Recovery Act
SC	Site Characterization
SD	Sediment
Site	Saranac Lake Gas Company Site
SVOC	semi volatile organic compounds

TAGM	Technical and Administrative Guidance Memoranda
TAL	target analyte list
TCL	Target Compound List
TP	Test Pit Soil
USDOT	United States Department of Transportation
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound
WA	Work Assignment
WP	Work Plan
WS	Waste Sample

1.0 INTRODUCTION

MACTEC Engineering and Consulting, PC (MACTEC), is submitting this Work Plan (WP) to the New York State Department of Environmental Conservation (NYSDEC). This WP addresses the Site Characterization (SC) at the former Saranac Lake Gas Company site (Site) in Saranac Lake, New York (Figure 1.1). This WP was prepared in response to Work Assignment (WA) No. D0004434-6 (NYSDEC, 2006), and in accordance with the requirements of the Superfund Standby Contract No. D0044434 between the NYSDEC and MACTEC.

The purpose of the SC is to evaluate whether a consequential amount of hazardous waste has been disposed at the Site as a result of past Site activities related to the former manufactured gas plant (MGP), and if so, whether the contaminant concentrations pose a significant threat and requires further investigation. This SC will also evaluate if there is a source of contamination in Brandy Brook and Pontiac Bay of Lake Flower related to the former MGP and/or whether MGP wastes have migrated into Lake Flower.

This WP represents the culmination of work under Task 1. During Task 1, MACTEC conducted a Site visit on September 27 and 28, 2006 to develop information necessary for the technical scope of work and associated field operations/sampling plan for the Site (see Section 3). The Quality Assurance Project Plan (QAPjP) is presented in Appendix A, and the Site specific Health and Safety Plan (HASP) is presented in Appendix B. The project organization, staffing plan, schedule, and costing for this WA are provided in the Project Management Work Plan (under separate cover).

Resources used to prepare this plan include: (1) information provided in the Work Assignment, (2) information gathered during the Site visit, (3) appropriate guidelines in the NYSDEC Draft DER-10 Guidance (NYSDEC, 2002), (4) results of previous investigations/spill reports, (5) NYSDEC guidelines pertaining to MGP Sites (http://www.dec.state.ny.us/website/der/mgp/dec_mgp.html) (6) Program Health and Safety Plan (MACTEC, 2005), and (7) Quality Assurance Program Plan (QAPP) (ABB Environmental Services, 1994).

2.0 SITE BACKGROUND AND PHYSICAL SETTING

Based on information provided by NYSDEC (NYSDEC, 2006), communications with NYSDEC personnel, and information gathered during the Site visit, the following describes the Site location, history, physical setting, and previous investigations. The information was used to prepare the scope of work for the SC field investigation (Section 3).

2.1 SITE LOCATION

The former Saranac Lake Gas Company Site is located in a residential setting on Payeville Road in the Village of Saranac Lake, Essex County, New York (Figure 1.1). The Site is located east of and to adjacent to the Adirondack Scenic Rail Road. Residential properties border the Site to the north and east and recreational facilities/soccer playing fields border the south. The Site property consists of approximately 0.75 acres.

2.2 SITE HISTORY

Based on information provided by NYSDEC (NYSDEC, 2006; NYSDEC 2001) and information gathered during the Site visit, the Saranac Lake Gas Company manufactured lighting gas (coal gasification) for the Village of Saranac Lake. According to Sanborn insurance maps and photos obtained from the town library, the MGP likely operated until the 1930s or 1940s and consisted of two above ground (or partially above ground) gas holders, a building housing the purifier and retort operations, as well as additional areas for coal storage and offices. The Site owner on the 1931 Sanborn map was listed as The Mountain Gas Company. Based on hand-written sketches on the 1931 map obtained, it appears there was a pre-1931 Sanborn map; however it was not obtained during the Site visit. The 1937 or 1945 Sanborn map (actual date unknown) documents the Site as being vacant and dilapidated, as well as the omission of one of the two gas holders. In a 1962 Sanborn map, the Site owner is listed as the Adirondack Bottled Gas Corp. and shows only the purifier and offices remaining. An aerial photo taken in the early 1970s indicates little change from the 1962 Sanborn map. No original structures from the MGP are present on the Site today, with the possible exception of a raised concrete storage pad and concrete foundation for one of the two gas holders.

The Site is currently occupied by Columbia Propane and is used to stage/store propane gas cylinders, tanks, and miscellaneous debris (concrete with rebar, bricks, propane cylinder parts, etc.).

2.3 PREVIOUS INVESTIGATIONS

No previous Site investigations are known to have been completed for the Site property; however sampling and analysis was documented as part of a 2001 Hazardous Substance Waste Disposal Site Nomination Form in which samples taken downstream from the Site in 1992 and 1993 from Brandy Brook and Pontiac Bay of Lake Flower indicated the presence of MGP wastes (NYSDEC, 2001). In addition, a 1989 NYSDEC Spill Report (NYSDEC, 1989) indicated stratified layers and pockets of coal tar-like material was observed at depths of 6 to 8 feet during the excavation of a house sewer located adjacent to Brandy Brook, just upstream of the intersection of River Road and Slater Avenue.

2.4 PHYSICAL SETTING

Topography

The Site is located in the Village of Saranac Lake, Essex County at approximately 1540 feet above mean sea level (msl). The topography in the immediate vicinity of the Site is characterized by a relatively flat grade. The Site is approximately 0.75 miles southeast of Pontiac Bay of Lake Flower (New York State GIS Clearinghouse at http://www.nysgis.state.ny.us/).

Climate

The climate of the area is characterized by moderately warm summers and cold winters. Mean monthly temperatures range from around 14 degrees Fahrenheit (°F) in January to 65°F in July. Average annual precipitation is about 40 inches (http://www.weather.com/weather/climatology/monthly/).

Surface Water Hydrology

Surface drainage at the Site is presumed to discharge to a storm drain located at the entrance of the driveway leading into the Site and Brandy Brook located adjacent to and alongside the northern portion of the property. Brandy Brook drains to Lake Flower at Pontiac Bay.

Groundwater Hydrology

Groundwater at the Site is assumed to be lake level, which is approximately 1534 ft above mean sea level (approximately 10 feet below ground surface [bgs]) and is interpreted to flow to the north-northwest based on surface topography in the area and that fact that MGP wastes have been detected in Brandy Brook and Pontiac Bay of Lake Flower, (NYSDEC, 2006).

Geology

The geology at the Site is predominately lacustrine sands and kame deposits (NYSDEC, 2006).

Site Visit

On September 27, 2006 MACTEC and NYSDEC personnel conducted a walkover of the Site area, including Brandy Brook and Lake Flower. The Site walkover consisted of viewing the Site property to scope proposed sampling locations and discuss the logistical aspects of the field program. MACTEC personnel documented the walkover with field notes, sketches, and/or photographs. On September 28, 2006 MACTEC personnel also obtained several pieces of historical Site information from the town library to document past Site uses.

2.5 REGULATORY FRAMEWORK

Under federal and state regulations a solid waste may be regulated as a hazardous waste if it is a material included in one of the United States Environmental Protection Agency's (USEPA) or the NYSDEC's lists of hazardous wastes. If a material is regulated because of its inclusion on a federal or state list, it is commonly referred to as a "listed hazardous waste." A waste may also be

regulated under the Resource Conservation and Recovery Act (RCRA) as a "characteristic hazardous waste" if it exhibits one of the characteristics of toxicity, corrosivity, reactivity, or flammability.

As defined by 6 New York Codes, Rules, and Regulations (NYCRR) Part 375, significant threat can be established by documenting a contravention of environmental standards. Surface water and groundwater are the only media for which New York State (NYS) has promulgated standards. Under NYS Water Quality Regulations (6 NYCRR Parts 700 705) the state has set numeric standards that are the maximum concentration of compounds in groundwater and surface water that protect public health and/or the environment (NYS, 1999b).

No analytical data has been collected from the Site and therefore it is not known with certainty if the former MGP at the Site is a source of contamination and/or has impacted downstream water bodies. Therefore, the purpose of this SC investigation will be to:

- collect the data necessary to determine if the former MGP is a source of contamination at the Site (i.e., uncontrolled waste disposal),
- determine if MGP wastes (if present) have migrated to groundwater, Brandy Brook, and/or Pontiac Bay of Lake Flower, and
- provide sufficient information regarding the SC to determine if the contamination (if present) poses a significant threat and requires further investigation.

3.0 SCOPE OF WORK

This Work Plan constitutes Task 1 (Work Plan Preparation) of the WA. WA Tasks 2 through 5 includes the SC field investigation (test pits, sediment sampling, soil borings, temporary well point installation, and Site mapping). Task 6 is the preparation and distribution of the SC Report.

Per the NYSDEC Draft DER-10 Guidance (NYSDEC, 2002), if MGP waste is encountered on site property during the SC field investigation, remaining field work on site (i.e., additional test pitting, Geoprobe borings) will not be completed. Planned sediment field investigations will be completed as scoped in this SC. In the event MGP waste is encountered on site, the NYSDEC PM will be notified prior to completing the SC Scope of Work.

The following subsections describe the activities planned during the SC field investigation. The field investigation will be conducted in accordance with the specifications presented in the QAPP (ABB-Environmental Services, 1994) and the Site specific QAPjP, included as Appendix A to this Work Plan. 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 Work Plan.

Off-site laboratory analyses will be performed by Mitkem Corporation, a New York State Department of Health approved laboratory. Off-site laboratory analysis will comply with the NYSDEC Analytical Services Protocols (ASP) (NYSDEC, 2005).

3.1 SITE INVESTIGATION

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. NYSDEC will be responsible for obtaining access to all Site and off-site locations prior to initiation of work activities.

Mobilization. Upon receiving the NYSDEC authorization to begin fieldwork, MACTEC and its subcontractors will mobilize to the Site and begin the field exploration program. Mobilization will include obtaining utility clearances and acquisition of field supplies and equipment necessary to perform the scope of work. A field team orientation meeting will be held on-site with MACTEC

personnel to familiarize field workers with Site history, health and safety requirements, equipment calibration procedures, and other field procedures.

Health and Safety. The Site specific HASP is provided as Appendix B to this document. Based on available Site information, MACTEC anticipates that the field investigation activities will be conducted at Modified Level D personal protection. Specific field investigation activities and required level of personal protection are set forth in the Site specific HASP (see 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 NYSDEC 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 Site specific HASP, work will stop and the situation will be reevaluated by the NYSDEC and MACTEC.

Decontamination. Sampling methods and equipment for this field program have been chosen to minimize decontamination requirements and minimize possibility of cross contamination. Disposable sampling equipment will be used as much as practical to minimize decontamination time and water disposal. Non disposable sampling equipment will be decontaminated before and after the collection of each sample. Decontamination methods and materials are described in detail in Subsection 4.3 of the NYSDEC Program QAPP (ABB-ES, 1994).

Non disposable sampling equipment will be decontaminated by 1) scrubbing the sample collection equipment with potable water and Liquinox, rinsing with potable water, rinsing with deionized water, and then allowing the equipment to air dry, or 2) steam cleaning the equipment and then allowing the equipment to air dry. Decontamination fluids will be released on-site to the ground surface in the area of decontamination, so as to allow the liquids to infiltrate into the soil and not run off-site. In the event that decontamination fluids exhibit visual or olfactory evidence of contamination, fluids will be containerized for off site disposal.

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

United States Department of Transportation (USDOT) approved 55 gallon containers filled during the field investigation will be staged on Site in an area designated by the NYSDEC. Transport and disposal of these containers will be the responsibility of MACTEC. Containers will be labeled as described in the Site specific QAPjP (see Appendix A).

Personal Protective Equipment. Used disposable equipment and protective clothing will be double bagged in polyethylene trash bags and sealed with twist ties. MACTEC personnel will measure the headspace in the closed bags with a photoionization detector (PID) at least one hour after sealing the bags. If the headspace reading is greater than 5 parts per million (ppm), the tubing will be decontaminated by flushing with potable water and re-bagged. This process will be repeated until PID readings are below 5 ppm. If the headspace is below 5 ppm, the disposable equipment and clothing will be disposed of as non-hazardous refuse.

Purge Water. Purge water will be released on-site to the ground surface in the area of the boring, so as to allow the liquids to infiltrate into the soil and not run off-site. In the event that purge water exhibits visual or olfactory evidence of contamination, fluids will be containerized in USDOT approved 55-gallon containers for off-site disposal.

Drill Cuttings. Drill cuttings from soil borings will be screened for total volatile organics 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 of the Site and in locations approved by the Site owner and the NYSDEC. If no on-site location is suitable for disposal of uncontaminated soils, the containerized material will be disposed at an off-site disposal facility.

3.1.1 Site Reconnaissance

Prior to the conduct of sampling activities, a Site reconnaissance will be performed to verify access and applicability of proposed sample locations. Brandy Brook and Pontiac Bay of Lake Flower will be visually surveyed to verify proposed sample locations are in depositional areas and/or meet the data quality objectives of this SC.

3.1.2 Sampling Plan

Field investigation activities include test pitting, sediment sampling, direct-push soil borings groundwater grab sampling, temporary well point installation. Test pits will be excavated above the water table in suspected source areas of MGP wastes on the Site (i.e., gas holders, purifier/retort building, tar wells, coal storage, and/or staging areas). Soil samples will collected from the test pits to characterize subsurface soil conditions in these suspected source areas. Direct-push soil borings (with groundwater grab samples) will also be advanced in and around the Site to further characterize subsurface soil and groundwater conditions. A minimum of three soil borings will be converted to temporary well points (micro wells) to aid in determining groundwater flow direction at the Site. To characterize groundwater conditions in the vicinity of the Site groundwater grab samples will be collected from soil borings exhibiting MGP waste and/or where visual observations suggest impact (sheen, elevated PID).

The Field Sampling Plan is intended to be flexible so that the number of samples, sampling locations, sample depths can be modified as the SC progresses. Sampling data will be reviewed in the field and the continuation of sampling will occur until the investigation objectives are met (i.e., assess potential source areas). If gross contamination is found, the NYSDEC PM will be consulted prior to completing the SC investigation.

MACTEC will work closely with the NYSDEC and the current property owner, as well as local entities or private parties to obtain access to the sampling locations. Approximate locations for the proposed samples are shown on Figures 3.1 through 3.3 and the sampling and analytical rationale is presented in Tables 3.1 and 3.2.

3.1.2.1 Test Pitting

Historical information regarding the Site has identified the location of the former MGP structures. For each structure identified MACTEC will conduct appropriate test pitting in order to determine if hazardous waste or hazardous substances were buried in each suspected area, and if so, the general physical and chemical characteristics of such waste. Samples will be taken from each test pit in the area of greatest contamination (visual evidence or PID Screening).

The test pit logging will be conducted according to Subsection 4.4.2 of the Program QAPP (ABB-ES, 1994) and documented on a test pit logging field data record (Figure 4-3 of the Program QAPP (ABB-ES, 1994)).

3.1.2.2 Sediment Sampling

Sediment sampling will consist of the collection of brook and lake bottom samples from Brandy Brook and Pontiac Bay of Lake Flower. In Brandy Brook, sampling will be located upstream of the Site, adjacent to, and downstream of the Site toward Pontiac Bay of Lake Flower. Locations will include any and all impoundments. The actual locations will be refined after the Site reconnaissance (Subsection 3.1.1).

Sediment sampling is being conducted in areas of Brandy Brook, and Pontiac Bay presumed to contain MGP wastes; therefore, hand probing will be done at the proposed locations to determine exact sample depths. Based on historical information, highly contaminated sediment is predominantly underneath clean to mildly contaminated sediment and is confined to the murky sediment layer (NYSDEC, 1993). Attempts will be made to sample the murky sediment layer and deeper hard sand layer to verify these findings.

Sediment sampling will be conducted according to Subsection 4.6.3 of the Program QAPP (ABB-ES, 1994) and documented on sediment sampling field data record (Figure 4-3 of the Program QAPP (ABB-ES, 1994)).

3.1.2.3 Direct-Push Soil Sampling

Soil samples will be collected using a four-foot long 1-to-2 inch diameter core sampler with an acrylic liner for the collection of discrete subsurface soil samples. Soil samples will be collected continuously to the top of the groundwater table. PID headspace readings will be used to screen soil samples for the presence of MGP waste as each soil sample is removed from the sample collection tube. Based on the PID screening results and observations, a soil sample will be collected from the location with the greatest potential for detecting MGP waste. 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 Field Data Record and as discussed in Subsection 4.6 of the QAPP.

3.1.2.4 Well Point Installation and Groundwater Grab Sampling

Groundwater grab samples will be collected at the water table from each soil boring location showing impact (visual evidence, PID screening) using a small diameter stainless steel wire wound screen that will be exposed to the aquifer. Tubing with a check valve or a Geopump will be used for the collection of discrete groundwater samples. One tubing volume of water will be purged and one set of parameters including temperature, conductivity, pH, and turbidity will be collected before sampling. VOC samples will be collected at a low purge rate (approximately 100 milliliters per minute) to minimize potential volatilization.

In addition to the groundwater grab samples, a minimum of three temporary well points will be installed to evaluate groundwater flow direction at the Site. Temporary well points will be driven into the water table by direct-push equipment. Well points will be constructed of 1.25-inch wire-wrapped steel screens fitted with steel casing and heavy-duty couplings. Alternatively, temporary well points comprised of one-inch polyvinyl chloride (PVC) screen and casing may be installed using direct-push methods. If this method is used, the screens will be installed with the appropriate sand filter packs and bentonite seals. Well points will be installed and diagramed in accordance with the relevant sections of the QAPP (Appendix A). Screens will be placed approximately 10 feet into groundwater bearing zone.

3.1.3 Site Survey

Upon completion of field investigation activities, a survey will be completed to delineate exploration locations and pertinent Site features in preparation of a Site map.

Vertical elevations of temporary well points will be tied to mean sea level, using National Geodetic Vertical Datum (NGVD) of 1927, and measured to an accuracy of 0.01 ft. Horizontal well measurements will be to an accuracy of 0.1 ft.

Test pit, sediment, and direct push locations will be surveyed using ground positioning satellite (GPS) and measured from a reference point to identify relative locations of samples collected as part of the SC. GPS measurements will be taken to an accuracy of one foot and use USGS datum for horizontal and vertical grid markings. If GPS coverage is not obtainable, exploration locations will be located using traditional survey methods, or by measuring off at least two known points.

3.2 SC DATA SUMMARY REPORT

Upon completion of field investigations and receipt of analytical data, MACTEC will initiate Task 6, preparation of the SC Data Summary Report.

The SC Data Summary Report will document the field investigation activities completed, results of the laboratory analysis, and include a summary of the Site background and history. Boring logs and environmental sampling data will be included as appendices to the Data Summary Report.

Analytical results will be compared to the appropriate published health standard or guidelines, as indicated below. Reported concentrations of individual analytes indicating contravention of standards or guidelines will be noted in the report.

Soil Samples. Analytical results will be compared to the Unrestricted Use Soil Cleanup Objectives in NYCRR Subpart 375-6.3(NYSDEC, 2006b).

Groundwater Samples. Analytical results will be compared to the NYS Class GA Groundwater Quality Standards, 6 NYCRR Part 703, (NYSDEC, 1999).

Sediment Samples. Sediment sample results will be compared to NYS Technical Guidance for Screening Contaminated Sediments (NYSDEC 1993, with updates).

The information provided in the Data Summary Report will assist the NYSDEC in determining whether the Site is a potential source of MGP waste contamination, and if so whether the contamination poses a significant threat and/or requires further investigation. A copy of the Site map will also be provided.

Three copies of the Draft SC Data Summary Report will be sent to the NYSDEC Project Manager for review and comment by the NYSDEC. NYSDEC will consolidate review comments and provide MACTEC with one set of review comments.

Up to five hard copies of the Final SC Data Summary Report and one electronic (PDF) version, including the Site map will be submitted to the NYSDEC project manager. 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.

4.0 REFERENCES

ABB Environmental Services, 1995. Program Quality Assurance Program Plan. Prepared for the New York State Department of Environmental Conservation, Albany, New York. June 1995.

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TABLES

TABLE 3.1: PROPOSED FIELD TASKS AND METHODOLOGY
Saranac Lake Gas Company Site # 5-16-008
Work Assignment #D004434-6

Exploration Type	Exploration ID	Location	Termination Criteria	Sample Determination	Rationale	Analytical[1]
Test Pit Soils	TP-01 to TP-05	Presumed locations of former MGP structures.	Approx 8 - 10 feet bgs (above water table).	Trench-like pit; collect soil/waste sample in area showing evidence of contamination, if applicable.	To characterize soil conditions within the former MGP site; verify presence or absence of MGP wastes.	TCL VOCs & SVOCs at all locations. Full TCL/TAL at location exhibiting highest contamination.
Geoprobe® Soil Explorations	GS-01 to GS-16	Locations within and around former MGP site.	Terminate at water table (approx 10 feet bgs).	Continuous samples to be collected from within and/or adjacent to and downgradient from former MGP features. Samples collected based on highest PID screening and/or visual observations.	To characterize soil conditions within the former MGP site; verify presence or absence of MGP wastes.	TCL VOCs & SVOCs at all locations. Full TCL/TAL at location exhibiting highest contamination.
Geoprobe® Groundwater	GW-01 to GW-16	Groundwater grab samples taken at the water table from Geoprobe® soil borings exhibiting evidence of MGP contamination.	Approx 10 feet bgs (terminate at water table)	Samples to be collected from soil borings suggesting MGP contamination (sheen, high PID screening, etc.)	To characterize groundwater conditions within the former MGP site.	TCL VOCs & SVOCs at all locations. Full TCL/TAL at location exhibiting highest contamination.
Geoprobe® Well Points	GW-02, GW-11, GW-14	Three well points installed; one presumed upgradient and two presumed down gradient.	Approximately 10 feet into water table	N/A	To evaluate groundwater flow direction at the Site.	N/A

TABLE 3.2
PROPOSED SAMPLE IDENTIFICATION AND ANALYSES

Saranac Lake Gas Company, Site# 5-16-008
Work Assignment #D004434-6

							Water Samples				Soil/Sediment Samples				
Site Type	**Media**	**Site ID**	**Sample ID**	**MS/MSD**	**DUP**	**RINSE BLANK**	**VOCs**	**SVOCS**	**PEST/ PCBs**	**TAL Inorganics (incl CN)**	**VOCs**	**SVOCS**	**PEST/ PCBs**	**TAL Inorganics (incl CN)**	**TOC**
Test Pit Excavation Soil Sampling															
Test Pit	Soil	TP-01	SLTP001___SCXX								1	1	TBD	TBD	
Test Pit	Soil	TP-02	SLTP002___SCXX								1	1	TBD	TBD	
Test Pit	Soil	TP-03	SLTP003___SCXX								1	1	TBD	TBD	
Test Pit	Soil	TP-04	SLTP004___SCXX								1	1	TBD	TBD	
Test Pit	Soil	TP-05	SLTP005___SCXX								1	1	TBD	TBD	
Test Pit	Soil	TP-##	SLTP0##___SCXD		X						1	1	TBD	TBD	
Test Pit	Soil	TP-##	SLTP0##___SCMS	X							1	1	TBD	TBD	
Test Pit	Soil	TP-##	SLTP0##___SCMD	X							1	1	TBD	TBD	
Test Pit	Blank	TP-QS1	SLTPQT01SCXX			X	1	1							
Test Pit	Waste Sample	WS-TP	SLWSTP___SCXX								GC/FID Fingerprint, TCLP, Reactivity, CN, Sulfur Content				
Sediment Sampling															
Brook Bottom	Sediment	SD-01	SLSD001___SCXX								1	1	TBD	TBD	1
Brook Bottom	Sediment	SD-02	SLSD002___SCXX								1	1	TBD	TBD	1
Brook Bottom	Sediment	SD-03	SLSD003___SCXX								1	1	TBD	TBD	1
Brook Bottom	Sediment	SD-04	SLSD004___SCXX								1	1	TBD	TBD	1
Brook Bottom	Sediment	SD-05	SLSD005___SCXX								1	1	TBD	TBD	1
Brook Bottom	Sediment	SD-06	SLSD006___SCXX								1	1	TBD	TBD	1
Brook Bottom	Sediment	SD-07	SLSD007___SCXX								1	1	TBD	TBD	1
Brook Bottom	Sediment	SD-08	SLSD008___SCXX								1	1	TBD	TBD	1
Lake Bottom	Sediment	SD-09	SLSD009___SCXX								1	1	TBD	TBD	1
Lake Bottom	Sediment	SD-10	SLSD010___SCXX								1	1	TBD	TBD	1
Lake Bottom	Sediment	SD-11	SLSD011___SCXX								1	1	TBD	TBD	1
Lake Bottom	Sediment	SD-12	SLSD012___SCXX								1	1	TBD	TBD	1
Lake Bottom	Sediment	SD-13	SLSD013___SCXX								1	1	TBD	TBD	1
Lake Bottom	Sediment	SD-14	SLSD014___SCXX								1	1	TBD	TBD	1
Lake Bottom	Sediment	SD-15	SLSD015___SCXX								1	1	TBD	TBD	1
Lake Bottom	Sediment	SD-16	SLSD016___SCXX								1	1	TBD	TBD	1
Lake Bottom	Sediment	SD-##	SLSD0##___SCXD		X						1	1	TBD	TBD	1
Lake Bottom	Sediment	SD-##	SLSD0##___SCMS	X							1	1	TBD	TBD	1
Lake Bottom	Sediment	SD-##	SLSD0##___SCMD	X							1	1	TBD	TBD	1
Sediment	Blank	SD-QS1	SLSDQS01SCXX			X	1	1							
Sediment	Waste Sample	WS-SD	SLWSSD___SCXX								GC/FID Fingerprint, TCLP, Reactivity, CN, Sulfur Content				

TABLE 3.2
PROPOSED SAMPLE IDENTIFICATION AND ANALYSES

Saranac Lake Gas Company, Site# 5-16-008
Work Assignment #D004434-6

							Water Samples				Soil/Sediment Samples				
Site Type	**Media**	**Site ID**	**Sample ID**	**MS/MSD**	**DUP**	**RINSE BLANK**	**VOCs**	**SVOCS**	**PEST/ PCBs**	**TAL Inorganics (incl CN)**	**VOCs**	**SVOCS**	**PEST/ PCBs**	**TAL Inorganics (incl CN)**	**TOC**
Geoprobe Soil Sampling															
Boring	Soil	GS-01	SLGS001___SCXX								1	1	TBD	TBD	
Boring	Soil	GS-02	SLGS002___SCXX								1	1	TBD	TBD	
Boring	Soil	GS-03	SLGS003___SCXX								1	1	TBD	TBD	
Boring	Soil	GS-04	SLGS004___SCXX								1	1	TBD	TBD	
Boring	Soil	GS-05	SLGS005___SCXX								1	1	TBD	TBD	
Boring	Soil	GS-06	SLGS006___SCXX								1	1	TBD	TBD	
Boring	Soil	GS-07	SLGS007___SCXX								1	1	TBD	TBD	
Boring	Soil	GS-08	SLGS008___SCXX								1	1	TBD	TBD	
Boring	Soil	GS-09	SLGS009___SCXX								1	1	TBD	TBD	
Boring	Soil	GS-10	SLGS010___SCXX								1	1	TBD	TBD	
Boring	Soil	GS-11	SLGS011___SCXX								1	1	TBD	TBD	
Boring	Soil	GS-12	SLGS012___SCXX								1	1	TBD	TBD	
Boring	Soil	GS-13	SLGS013___SCXX								1	1	TBD	TBD	
Boring	Soil	GS-14	SLGS014___SCXX								1	1	TBD	TBD	
Boring	Soil	GS-15	SLGS015___SCXX								1	1	TBD	TBD	
Boring	Soil	GS-16	SLGS016___SCXX								1	1	TBD	TBD	
Boring	Soil	GS-##	SLGS0##___SCXD		X						1	1	TBD	TBD	
Boring	Soil	GS-##	SLGS0##___SCMS	X							1	1	TBD	TBD	
Boring	Soil	GS-##	SLGS0##___SCMD	X							1	1	TBD	TBD	
Boring	Blank	GS-QS1	SLGSQS01SCXX			X	1	1							
Boring	Waste Sample	WS-GS	SLWSGS___SCXX								GC/FID Fingerprint, TCLP, Reactivity, CN, Sulfur Content				
Geoprobe Groundwater Sampling															
Boring	Groundwater	GW-01	SLGW001___SCXX				1	1	TBD	TBD					
Boring	Groundwater	GW-02	SLGW002___SCXX				1	1	TBD	TBD					
Boring	Groundwater	GW-03	SLGW003___SCXX				1	1	TBD	TBD					
Boring	Groundwater	GW-04	SLGW004___SCXX				1	1	TBD	TBD					
Boring	Groundwater	GW-05	SLGW005___SCXX				1	1	TBD	TBD					
Boring	Groundwater	GW-06	SLGW006___SCXX				1	1	TBD	TBD					
Boring	Groundwater	GW-07	SLGW007___SCXX				1	1	TBD	TBD					
Boring	Groundwater	GW-08	SLGW008___SCXX				1	1	TBD	TBD					
Boring	Groundwater	GW-09	SLGW009___SCXX				1	1	TBD	TBD					
Boring	Groundwater	GW-10	SLGW010___SCXX				1	1	TBD	TBD					
Boring	Groundwater	GW-11	SLGW011___SCXX				1	1	TBD	TBD					
Boring	Groundwater	GW-12	SLGW012___SCXX				1	1	TBD	TBD					
Boring	Groundwater	GW-13	SLGW013___SCXX				1	1	TBD	TBD					

TABLE 3.2
PROPOSED SAMPLE IDENTIFICATION AND ANALYSES

Saranac Lake Gas Company, Site# 5-16-008
Work Assignment #D004434-6

							Water Samples				Soil/Sediment Samples				
Site Type	**Media**	**Site ID**	**Sample ID**	**MS/MSD**	**DUP**	**RINSE BLANK**	**VOCs**	**SVOCS**	**PEST/ PCBs**	**TAL Inorganics (incl CN)**	**VOCs**	**SVOCS**	**PEST/ PCBs**	**TAL Inorganics (incl CN)**	**TOC**
Boring	Groundwater	GW-14	SLGW014___SCXX				1	1	TBD	TBD					
Boring	Groundwater	GW-15	SLGW015___SCXX				1	1	TBD	TBD					
Boring	Groundwater	GW-16	SLGW016___SCXX				1	1	TBD	TBD					
Boring	Blank	GW-QS1	SLGWQS01SCXX			X	1	1							
Boring	Groundwater	GW-##	SLGW0##___SCXD		X		1	1	TBD	TBD					
Boring	Groundwater	GW-##	SLGW0##___SCMS	X			1	1	TBD	TBD					
Boring	Groundwater	GW-##	SLGW0##___SCMD	X			1	1	TBD	TBD					
			TRIP BLANK				3				4				
TOTAL PROPOSED SAMPLES				4	4	4	26	23		0	50	46		0	19

Notes:

Prepared/Date: JPC 12/19/06
Checked/Date: JWP 12/21/06

Sample ID = 14-digit sample identification as outlined in the QAPP. The 8,9, and 10 digit locations represent the sample depth below ground surface (__ = be determined in field)
= actual sample location TBD in field at time of collection
MS/MSD = matrix spike/matrix spike duplicate
DUP = field duplicate
RINSE BLANK = rinsate field blank
VOCs, SVOCs, TAL Inorganics (incl CN) = Target Compound List / Target Analyte List analyzed by NYSDEC ASP 2005 SW-846 methods
CN = cyanide
TCLP = toxicity characteristic leaching procedure
TBD = To Be Determined; Full TCL/TAL at locations exhibiting highest contamination.

TABLE 3.1: PROPOSED FIELD TASKS AND METHODOLOGY
Saranac Lake Gas Company Site # 5-16-008
Work Assignment #D004434-6

Exploration Type	Exploration ID	Location	Termination Criteria	Sample Determination	Rationale	Analytical[1]
Sediment	SD-01 to SD-08	Brandy Brook	TBD - brook bottom sediment showing MGP waste, if applicable.	Samples to be collected upstream, adjacent to and downstream of Site in Brandy Brook.	To characterize sediment conditions; verify presence or absence of MGP wastes.	TCL VOCs, SVOCs, & TOC at all locations. Full TCL/TAL at location exhibiting highest contamination.
Sediment	SD-09 to SD-12	Pontiac Bay of Lake Flower	TBD - lake bottom sediment showing MGP waste, if applicable.	Samples to be collected within suspected area of MGP contamination within Pontiac Bay of Lake Flower.	To characterize sediment conditions; verify presence or absence of MGP wastes.	TCL VOCs, SVOCs, & TOC at all locations. Full TCL/TAL at location exhibiting highest contamination.

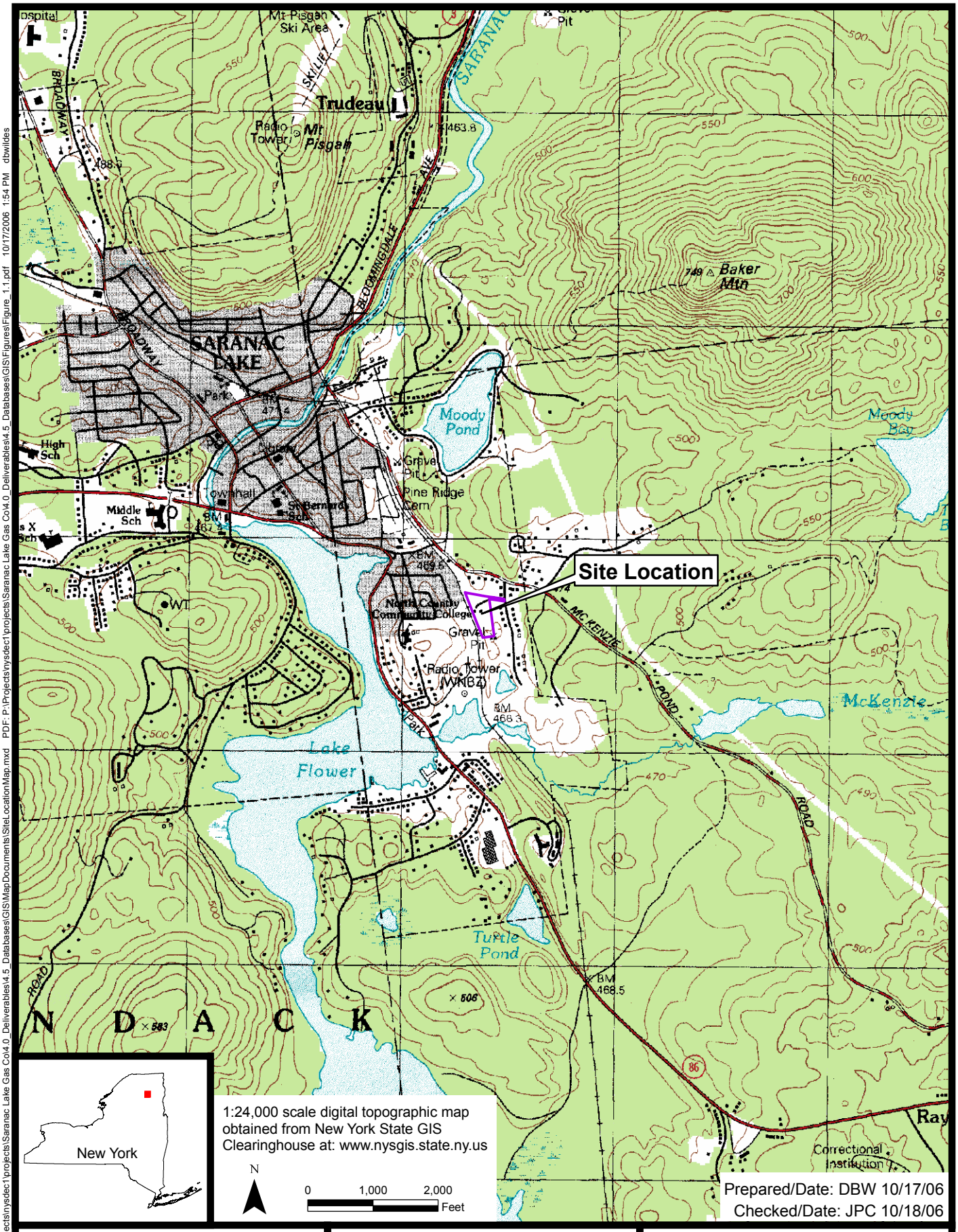
Prepared/Date: JPC 12/19/06
Checked/Date: JP 12/21/06

NOTES:

TCL VOCs	Target Compound list Volatile Organic Compounds by 8260.
TCL SVOCs	Target Compound list Semivolatile Organic Compounds by 8270.
TAL Inorganics	Target Analyte list Metals plus cyanide by 6010/7470/7471/9010.
TOC	Total Organic Carbon by 9060
MGP	Manufactured Gas Plant
PID	photoionization detector
TBD	To Be Determined
bgs	below ground surface
N/A	Not applicable

[1] If MGP waste is encountered, collect one waste sample from each media (soil, sediment) for fingerprinting analysis and hazardous characteristics (full TCLP, reactivity, cyanide, sulfur).

FIGURES



NYSDEC
Saranac Lake Gas Co., Inc.
Saranac Lake, New York

MACTEC

Site Location Map
Project 3612-06-2058
Figure 1.1

NYSDEC
Saranac Lake Gas Co., Inc.
Saranac Lake, New York

MACTEC

Proposed Locations
Payville Road Site
Project 3612-06-2058 Figure 3.1

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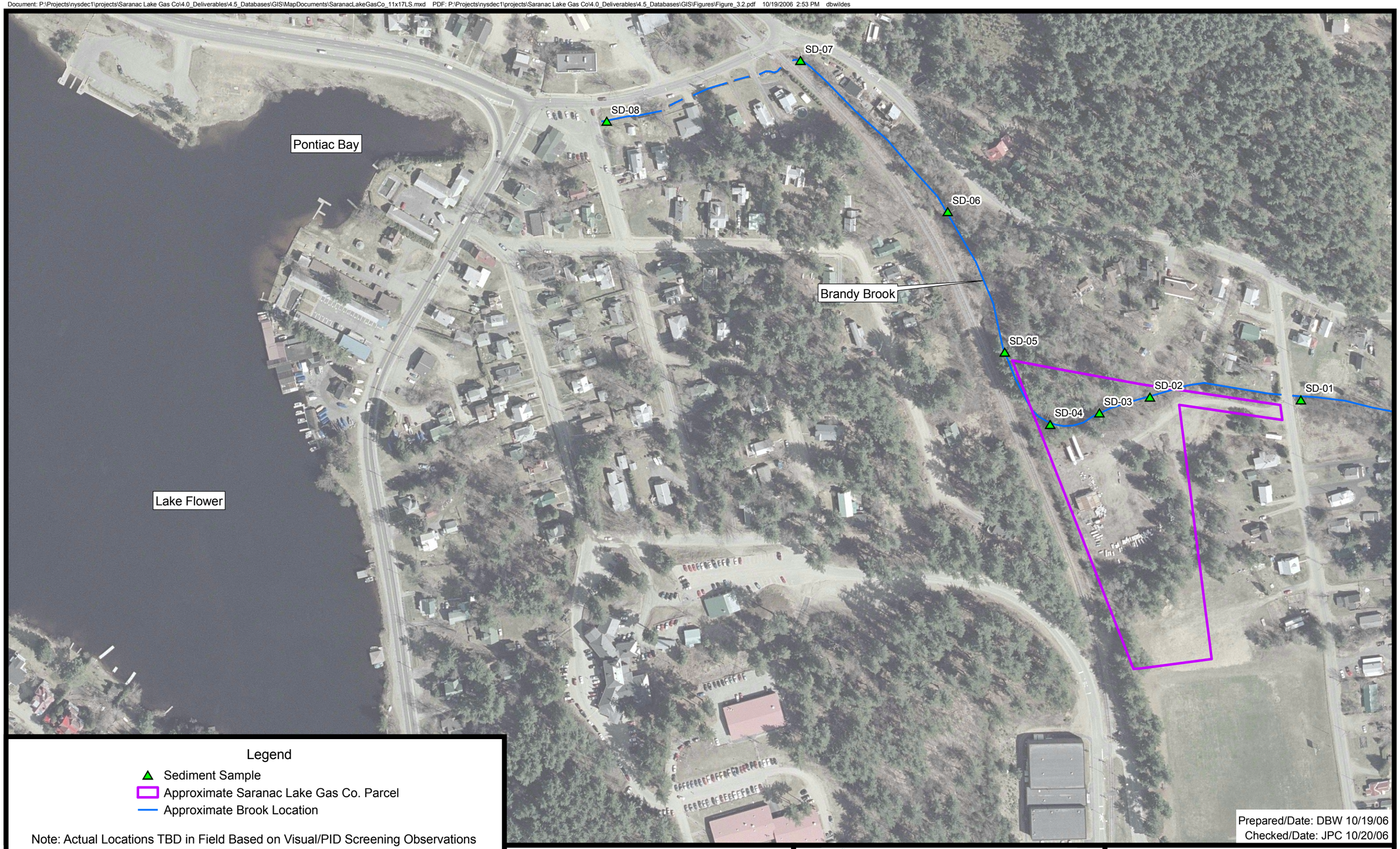

Legend

- Sediment Sample
- Approximate Saranac Lake Gas Co. Parcel
- Approximate Brook Location

Note: Actual Locations TBD in Field Based on Visual/PID Screening Observations

N

0 100 200 Feet

Prepared/Date: DBW 10/19/06
Checked/Date: JPC 10/20/06

NYSDEC
Saranac Lake Gas Co., Inc.
Saranac Lake, New York

MACTEC

Brandy Brook
Proposed Sample Locations
Project 3612-06-2058 Figure 3.2

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Legend

- Sediment Sample
- Approximate Brook Location

Note: Actual Locations TBD in Field Based on Visual/PID Screening Observations

N

0 40 80 Feet

Prepared/Date: BRP 12/01/06
Checked/Date: JPC 12/01/06

NYSDEC
Saranac Lake Gas Co., Inc.
Saranac Lake, New York

MACTEC

Pontiac Bay, Lake Flower
Proposed Sample Locations
Project 3612-06-2058 Figure 3.3

APPENDIX A

SITE-SPECIFIC QUALITY ASSURANCE PROJECT PLAN (QAPjP)

QUALITY ASSURANCE PROJECT PLAN
SARANAC LAKE GAS COMPANY SITE

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

This Quality Assurance Project Plan (QAPjP) identifies sections of the QAPP (ABB ES, 1994) 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 Saranac Lake Gas Company 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
Sample Container Requirements and Sample Preservation	Subsection 4.2
Decontamination	Subsection 4.3
Sample Handling	Subsection 4.3 and Section 5.0
General Soil Sampling Methodology	Subsection 4.6.4
General Water Sampling Methodology	Subsection 4.6.1
General Sediment Sampling	Subsection 4.6.3
Terraprobe Sampling	Subsection 4.6
Field Instrument Calibration	Section 6.0

The following variances to the above procedures are described in Subsections 2.1 to 2.4.

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 Site.

Geoprobe® 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 of the Site.

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

2.2 SAMPLING AND ANALYSIS PROGRAM

Data Quality Objectives (DQOs) for 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, 1997).

2.3 SAMPLING IDENTIFICATION

Sample identification will adhere to Subsection 4.1 of the QAPP with the following exception and clarifications:

Digits 1,2 Sample identification will begin with the Site designator SL for Saranac Lake Gas Company

Digits 3,4 Sample Type will include the following identifications:

GS – Geoprobe® Soil

GW – Geoprobe® Water

SD – Sediment

TP – Test Pit Soil

WS – Waste Sample

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.

2.5 MICROWELL INSTALLATION

To determine groundwater flow direction at the Site, four Geoprobe® borings will be completed as microwells. Microwell locations are shown in Figure 3.1. Groundwater is anticipated to be near 10 feet bgs, based on previous investigations. Microwells will be installed after soil and groundwater samples have been collected from each boring. The microwells will be installed as piezometers and used for water level measurements only. Microwells will be constructed with schedule 40 polyvinyl chloride (PVC), with 10 foot lengths of 0.01-inch machine slotted well screens. The well screens will be set with approximately 2 feet of screen above the water table to determine water table elevations and create a potentiometric map. The wells will be constructed with a # 0 sand pack to 3 feet above the screen, a three 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. The wells will be developed for twenty minutes with a peristaltic or inertial (i.e. Waterra) pump to clean the screen and determine if the wells are conductive with groundwater.

REFERENCE

ABB Environmental Services, 1994. Program Quality Assurance Program Plan. Prepared for the New York State Department of Environmental Conservation, Albany, New York. June 1994.

New York State Department of Environmental Conservation (NYSDEC), 2005. *"Analytical Services Protocols"*; 7/05 Edition; July 2005.

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 and soil.	Level I
TCL Organics, TAL Inorganics (includes CN), TCLP	Provides analytical information to compare to standards and guidance values.	Level III
Coal Tar Fingerprint	Provides quantitative information to identify type of contamination.	Level III

Notes:
PID = photoionization detector
TCL = target compound list
TAL = target analyte list
CN = cyanide

Table A-2:
Summary of Analytical Methods

Media	Parameter	Method[1]
Groundwater	TCL VOCs	8260
	TCL SVOCs	8270
	TAL Inorganics (+CN)	6010/7470/9010 (or equivalent)
Soil & Sediment	TCL VOCs	8260
	TCL SVOCs	8270
	TAL Inorganics (+CN)	6010/7470/9010 (or equivalent)
	TOC (Sediment only)	9060
MGP Waste	TCLP (full)	8260,8270,8081,8150, 6010/7470
	Reactivity	ASP Vol 2., Part XV
	Cyanide	9010 (or equivalent)
	Sulfur	ASTM D129, D1552, D622
	Coal Tar Fingerprint	GC/FID (8015M)

Notes:
[1] = Methods in accordance with NYSDEC 2005 ASP.
TCL = target compound list
TAL = target analyte list
VOCs = volatile organic compounds
SVOCs = semi volatile organic compounds
CN = cyanide
MGP = manufactured gas plant
TOC = Total Organic Carbon

APPENDIX B

HEALTH AND SAFETY PLAN

MACTEC Engineering and Consulting, P.C.

HEALTH AND SAFETY PLAN

MACTEC Engineering and Consulting, PC. (MACTEC), under contract to the New York State Department of Environmental Conservation (NYSDEC), is implementing a Site Characterization (SC) of the Saranac Lake Gas Company site (Site) in Saranac Lake, New York. The Site is included in the inventory of hazardous substance waste disposal sites; Site No. 5-16-008 by the NYSDEC. This Health and Safety Plan (HASP) has been prepared in accordance with the requirements or the NYSDEC as identified in Work Assignment (WA) No. D004434-6, under the Superfund Standby Contract between MACTEC and the NYSDEC.

The purpose of this HASP is to protect the health and safety of on-site personnel and the surrounding community during investigation activities at the Site. This HASP is based on the MACTEC Program HASP (MACTEC, 2005) and consists of a Site-specific HASP Addendum to document Site-specific aspects of the Site SC.

Prior to initiation of field activities, MACTEC will notify the local fire, police, and potential emergency responders, as deemed necessary, to advise them of the investigation activities that will take place and the schedule of these activities. If necessary adjacent property owners will be notified, however, the Site is a low hazard Site and notification of adjacent property owners is not anticipated as a necessary procedure unless specific access is required to adjacent properties.

In the event of an emergency or corresponding evacuation procedure, evacuation procedures documented in the HASP Addendum will be followed and the emergency contacts notified.

Attachment:

MACTEC, Inc.

MACTEC Short Form HASP

Site: Saranac Lake Gas Company Job Number: 3612062058-01
Street Address: Payeville Road, Saranac Lake NY 12983
Proposed Date(s) of Investigation: April 07 – May 07
Prepared by: Kendra Bavor Date: 11-30-2006
*Approved by: K. Bavor Date: 11/30/2006
Site Description: Closed Propane distribution company. Previously the site of the Saranac Lake Gas Company used for manufacturing lighting gas.
Proposed Activity(s): Test pitting and Brook sediment sampling

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

Known or Suspected Contaminants (include PELs/TLVs):

Contaminants of Concern	PEL/TLV
BTEX (benzene)	0.5ppm/2.5ppm STEL
PAHs (Napthalene)	10 ppm or 50 mg/m3
Coal Tar Pitch Volatiles	0.2 mg/m3
Cyanide	5 mg/m3 ceiling (skin)

JHAs: Check and attach all that apply:

Activity Specific JHAs:

☒	Mobilization/Demobilization and Site Preparation
☒	Field Work - General
☒	Groundwater Sampling (JPC 12/22/06)
☐	Drilling Operation (MACTEC Driller)
☐	Soil Sampling
☒	Geoprobe (MACTEC Geoprobe Operator (JPC 12/22/06)
☒	Excavations and Backfilling
☐	Decontamination
☒	Stream/Wetlands Work
☐	Clearing Brush and Trees
☐	Chain Saw
☐	

Hazard Specific JHAs:

☒	Insect Stings and Bites
☒	Working with Preservatives (Acids)
☒	Dog and Wildlife Safety
☒	Surface water sediment sampling from shore
☒	Work in Mud area
☐	
☐	
☐	
☐	
☐	

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

Chemicals	MSDS Attached?
HCl	☒
NaOH	☒
	☐
	☐

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

HAZARD IDENTIFICATION SUMMARY

Complete the checklist for summarizing the hazards identified in the JHAs

Standard Hazards			
☐ Falling Objects	☒ Slips and trips	☐ Pinch points	☐ Rotating equipment
☒ Falls	☒ Power equipment/tools	☐ Elevated work surfaces	☐ _____
Eye Hazards			
☐ Particulates	☒ Liquid splashes	☐ Welding Arc	☐ _____
Hearing Hazards			
☐ None	☐ Impact noise	☐ High frequency noise	☒ High ambient noise
Respiratory Hazards			
☐ None	☐ Dust / aerosols / particulates	☒ Organic Vapors	☐ Acid Gases
☐ Oxygen deficient	☐ Metals	☐ Asbestos	☐ _____
Chemical Hazards			
☐ None	☒ Organic solvents	☐ Reactive metals	☐ PCBs
☒ Acids / bases	☐ Oxidizers	☒ Volatiles/Semi-volatiles	☒ Cyanide
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 (stored propane tanks)	☐ Oxygen enriched location
Ergonomic Hazards			
☒Lifting	☒ Bending	☒ Twisting	☒Pulling/tugging
Computer Use in the: ☐ Office ☐ Field	☐ Repetitive motion	☒ Carrying	☐ _____
Radiological Hazards			
☒ None	☐ Alpha	☐ Beta	☐ Gamma/X-rays
☐ Neutron	☐ Radon	☐ Non-Ionizing	☐
Other Hazards			
☐			
☐			

PPE and Monitoring Instruments

Initial Level of PPE				
☐ Level D	☒ Modified Level D	☐ Level C	☐ Level B*	☐ Level A*
* Cannot use short form HASP for Level B or A work				
Standard PPE				
☒ Hard Hat	☒Safety boots	☒ Safety glasses	☒Chemical Resistant Boots	
☒High visibility vest	☐ Other:_____			
Eye and Face Protection				
☐ Face shield	☐ Vented goggles	☐ Unvented goggles	☐ Indirect vented goggles	
Hearing Protection				
☒Ear plugs	☐ Ear Muffs	☐ Ear plugs and muffs	☐ Other _____	
Respiratory Protection				
☐ None	☐ Dust mask	☐ Full Face APR ☐ Half Face APR	Cartridge Type: _____ Change Cartridges: _____	
Protective Clothing				
☐ White uncoated Tyvek®	☐ Poly-coated Tyvek®	☐ Saranex®	☐ Work uniform (long sleeves, long pants)	
☐ Boot covers	☐ Reflective vest	☐ Chaps or Snake Legs	☐ Other _____	
Hand Protection				
☐ None	☐ Cotton gloves	☐ Leather gloves	☐ Glove liners	
☒Outer Gloves List Type__Nitrile_____	☐ Inner Gloves List Type_____	☐ Cut-resistant gloves	☐ Other _____	
Monitoring Instruments Required				
☐ LEL/O2 Meter	☒ PID ☐ 10.0-10.6 eV Lamp ☐ 11.7 eV Lamp	☐ FID	☐ Hydrogen Sulfide/Carbon Monoxide	
☒ Dräger Pump (or equivalent) List Tubes_____Benzene_____ _____		☐ Dust Meter ☐ Respirable dust ☐ Total dust	☐ Other _____	

Air Monitoring Action Levels:

PID READING [1]	DETECTOR TUBE [1]	ACTION	REQUIRED PPE
Above background	0.5 benzene or staining	Back off, cease work, re-evaluate situation. Contact Division EH&S Manager.	
Visual dust present		If visual dusty conditions, cease work. Establish dust monitoring or use dust control methods. Contact Division EH&S Manager.	

[1] Sustained readings measured in the breathing zone

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 outergloves 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 with 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
X Visual Observations

Site Communication:

X Verbal
X 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

X Horn
_____ Siren
_____ Other:

EMERGENCY CONTACTS

NAME	TELEPHONE NUMBERS		DATE OF PRE-EMERGENCY NOTIFICATION (if applicable)
Fire Department:	911		
Hospital:	518-891-04141		
Police Department:	911		
Site Health And Safety Officer:	Office:	Home:	
Client Contact: Alicia Thorne	Office: ( ) 897-1255	Pager:	
Project Manager: John Peterson	Office: 207-775-5401	Home:	
Division EH&S Manager: Cindy Sundquist	Office: 207-828-3309	Cell: 207-650-7593	
EPA/DEP (if applicable): NYSDEC Regional director: Russell Huyck			
OTHER: Ambulance	911		

Emergency Equipment:

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

X 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.
- 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.

Routes to Emergency Medical Facilities

PRIMARY HOSPITAL:

Facility Name:_____ **Adirondack Medical Center**_____

Address:___Lake Colby Drive, Saranac Lake, NY 12983_____

Telephone Number_____518-891-04141_____

DIRECTIONS TO PRIMARY HOSPITAL (attach map):

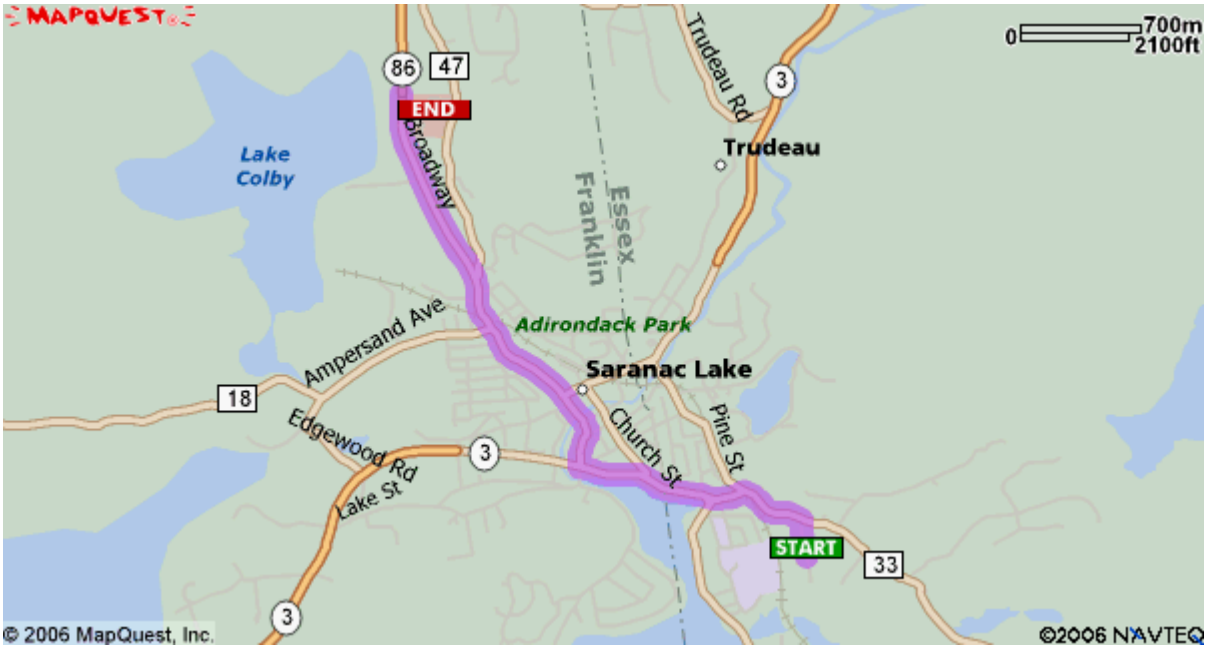
Maneuvers		Distance
START	**1:** Start out going NORTH on PAYEVILLE RD toward PINE ST.	0.1 miles
	2: Turn LEFT onto PINE ST.	0.2 miles
	3: Turn SLIGHT LEFT onto BRANDY BRK.	0.1 miles
	4: BRANDY BRK becomes RIVER ST.	0.4 miles
	5: Turn RIGHT onto MAIN ST / NY-3 / NY-86. Continue to follow NY-3 / NY-86.	0.3 miles
	6: Stay STRAIGHT to go onto BROADWAY / NY-86. Continue to follow NY-86.	1.3 miles

There are .12 miles between your ending location and the end of your driving directions. Use maps to get from your ending location to the end of your route.

END	**7:** End at **Adirondack Medical Ctr:** Lake Colby Dr, Saranac Lake, NY 12983, US	

Total Est. Time: 8 minutes **Total Est. Distance:** 2.69 miles

Total Est. Time: 8 minutes**Total Est. Distance:** 2.69 miles



Start:
[16-102] Payeville Ln
Saranac Lake, NY 12983, US
End:
Adirondack Medical Ctr: 518-891-4141
Lake Colby Dr, Saranac Lake, NY 12983, US

ALTERNATE HOSPITAL:

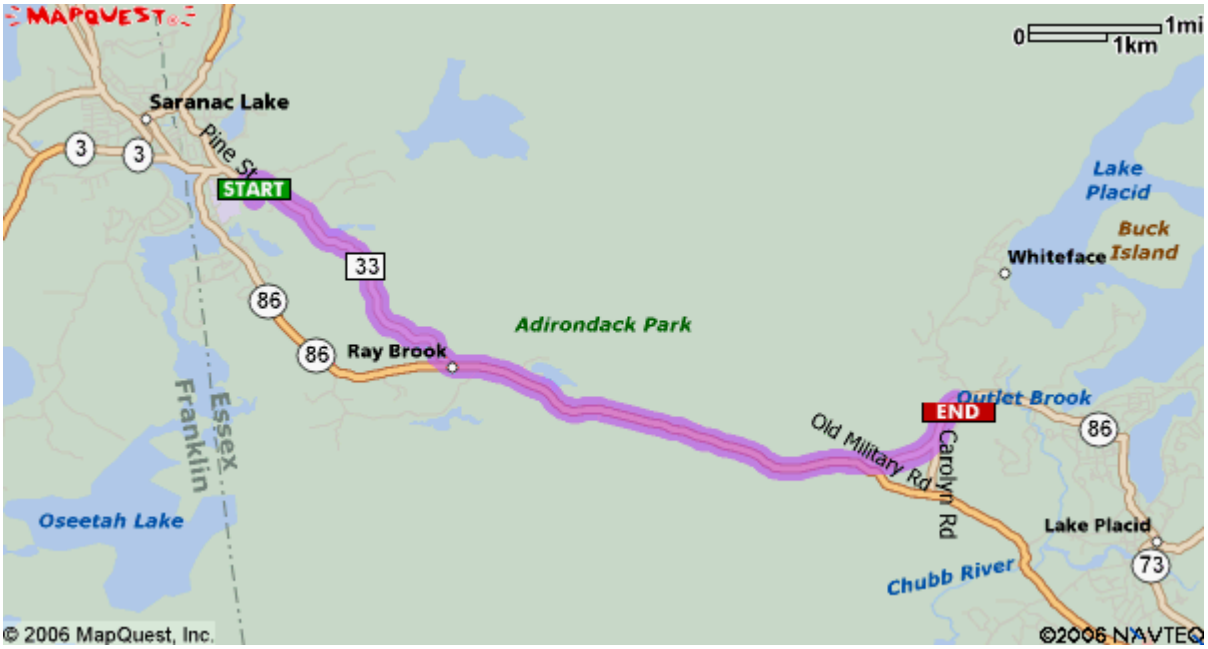
Facility Name:___Mountain Medical Service_____

Address:_____212 Saranac Ave, Lake Placid NY 12946_____

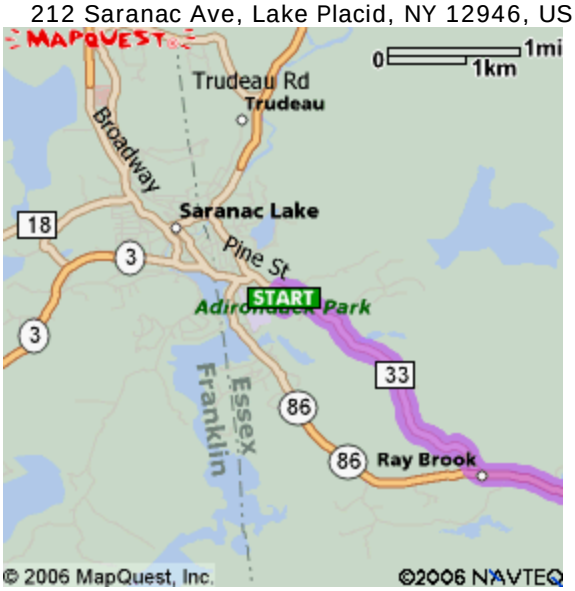
Telephone Number____518-523-7575_____

DIRECTIONS TO ALTERNATE HOSPITAL (attach map):

Directions			Distance
		Total Est. Time: 10 minutes **Total Est. Distance:** 6.68 miles	
START	**1:**	Start out going NORTH on PAYEVILLE RD toward PINE ST.	0.1 miles
	2:	Turn RIGHT onto PINE ST.	<0.1 miles
	3:	PINE ST becomes CR-33.	2.2 miles
	4:	Turn SLIGHT LEFT onto NY-86.	4.2 miles
END	**5:**	End at **Mountain Medical Svc:** 212 Saranac Ave, Lake Placid, NY 12946, US	
		Total Est. Time: 10 minutes**Total Est. Distance:** 6.68 miles	



Start:
[16-102] Payeville Ln
Saranac Lake, NY 12983, US
End:
Mountain Medical Svc: 518-523-7575
212 Saranac Ave, Lake Placid, NY 12946, US



MACTEC

Job Hazard Analysis - Short Form HASP

Job Title: Dog and Wildlife Safety **Date of Analysis:** 9/26/06

Minimum Recommended PPE*: Long sleeved shirt and pants, safety shoes
*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Working in areas with potential wild animals or dogs exist, example outdoor wooded areas, fields or residential areas.	1A) Preparation for Site Visit	1A) Preparation for Site Visit ▪ Call land owner prior to site visit. ▪ Arrange for appointment time so animals can be restrained during the visit. ▪ Wear field clothes such as long pants, long sleeves, and boots to provide protection if attacked.
	1B) Preventing Bites or Attacks	1B) Preventing Bites or Attacks ▪ Be aware of surroundings. Locate and work at safe distance from dens, nests, warrens, cages, leashed animals, or "homes" of animals. ▪ Learn body language and warning signs of animals posturing to attack. ▪ See attached drawings and explainations of animal behavior ▪ Do not approach strange dogs especially one who's tied, tethered or confined behind a fence or in a car. They often feel vulnerable and will fight to protect their territory ▪ Never hang over fences or put your hands through fence openings to touch a dog, even one you know. ▪ Never approach a dog that is acting afraid, growling, showing teeth or who has puppies - even if the owner is there. ▪ Don't disturb a dog while sleeping, eating, chewing on a toy, or caring for puppies. ▪ Always let the dog sniff you first before petting. Pat on the back or side, reaching over a dog's head may scare him. ▪ Never run past a dog. Joggers and children on bicycles can trigger their instinct to chase and attack ▪ Never tease a dog by pulling ears, tail or feet or play too rough. Avoid games such as tug-of-war, jumping up for toys/food, wrestling and chase, all could lead to injury if the game gets out of hand ▪ Be careful around older dogs. They may be blind, sensitive to touch or hearing-impaired ▪ Never try to break up a dog fight with your hands. Use a water hose, stick or throw a blanket over the dogs to disorient them ▪ Alert animal control to stray or roaming dogs.
	1C) Attacking Animal	1C) Attacking Animal ▪ If an animal shows aggressive behavior, slowly walk away from it. ▪ If the animal approaches you, remain calm and quiet. Never turn your back, scream and run away. Avoid sudden movements. ▪ If you say anything, speak calmly and firmly ▪ If the animal still follows you, remain motionless with hands at your sides. Face the animal but turn your head away and avoid eye contact. If you are boring or not a threat, there is a good chance the animal will lose interest and move on. ▪ If the animal does attack, put anything that you can put between yourself and the animal like a tree or car. ▪ If lunged at, don't try to overpower the animal. ▪ If you're holding something, put it into his mouth. If you don't have anything in your hand, put your arm up to protect your face. ▪ If the animal jump son you or knocks you down, don't move or scream or roll around. Pretend that you are a turtle: curl into a ball, face down, cover your head with your arms and use your hands to protect the back of your neck. Stay in this position until the animal leaves.

MACTEC

Job Hazard Analysis - Short Form HASP

Job Title: Dog and Wildlife Safety **Date of Analysis:** 9/26/06

2. If bitten or wounded.	2A) Allergic reactions, excessive bleeding, broken bones	2A) Allergic reactions, excessive bleeding, broken bones ▪ Field crews must maintain a stocked first aid kit. ▪ Work using the buddysystem or maintain communicaitons by radio or cell phone. ▪ If you or anyone you are working with is allergic. Make sure you carry emergency medication with you at all times. ▪ If the victim develops hives, asthmatic breathing, tissue swelling, or a drop in blood pressure, seek medical help immediately. ▪ If the person is bitten, apply pressure to stop bleeding. - Immediately wash the area thoroughly with soap and water. - Cover lightly with an antiseptic ointment. - Cover with a sterile bandage. - See medical attention for additional care and advice as appropriate. ▪ If bitten, contact authorities (the local animal care and control agency) and tell them everything you can about the dog: the owner's name and address, if you know it; color of the dog; size; where you saw it; if you've seen it before, if you know it is a stray, and in which direction the dog went. These details may help animal-control officers locate the dog
	2B) Rabid Animal	3A) Rabid Animal ▪ If the animal is a vaccinated pet, follow the steps for basic bite care above. ▪ If you can identify or safely capture the animal, this may help your doctor determine if you need anti-rabies therapy. The dog may need to be quarantined. ▪ If it is a wild animal, only try to capture it if you can do so without getting bitten again. If the animal cannot be contained and must be killed to prevent its escape, do so without damaging the head. The brain will be needed to test for rabies.

MACTEC

Job Hazard Analysis - HASP Format

Job Title: Excavation and Backfilling **Date of Analysis:** 5/30/06

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

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Identify location of underground utilities	1A) Encountering electrical, gas, communications, water, or other underground utility lines	1A) Identify utility locations prior to mobilizing: ▪ Contact "Dig Safe" and obtain a permit (or one call center) to have underground utilities located and marked prior to any subsurface work on site. ▪ Use facility engineers and/or employ a private utility locator for utilities on private property
2. Excavation of soils	2A) Underground utilities	2A) Underground utilities ▪ Work at adequate offsets from utility locations ▪ For areas where utility locations cannot be verified, workers must hand dig for the first 3 feet ▪ Immediately cease work if unknown utility markings are discovered. ▪ Conform to utility clearances based on voltage of lines. For powerlines of 50 KV or less stay at least 10 feet away. For powerlines of > 50 KV, add an additional 0.4 inches per KV over 50 KV. Rule of thumb: Stay 10 feet away if powerline known to be 50 KV or less. Stay 35 feet away for lines > 50 KV or if voltage is unknown.
	2B) Vapor/Dust Exposure	2B) Vapor/Dust Exposure ▪ Conduct breathing zone air monitoring as described in the HASP. ▪ Implement dust control measures as applicable. ▪ Wear proper PPE (see HASP).
	2C) Odors	2C) Odors ▪ Implement odor control mitigation in accordance with the Site Management Plan.
	2D) Heavy Equipment	2D) Heavy Equipment ▪ See General Site Hazards
	2E) Cave-ins	2E) Cave-ins Excavation work must be conduct in accordance with OSHA 1926 Subpart P (650-652) Excavations including but not limited to: ▪ Designate a competent person to inspect, decide soil classification, proper sloping, the correct shoring, or sheeting for the excavation ▪ Walls and faces of trenches 5 feet or more deep, and all excavations in which employees may be exposed to danger from moving ground or cave-in shall be guarded by a shoring system, sloping of the ground, or some other equivalent means. ▪ Cordon-off the perimeter of the excavation to delineate cave-in hazard area. ▪ Construct diversion ditches or dikes to prevent surface water from entering excavation and provide good drainage of the areas surrounding the excavation. ▪ Collect ground water/rain water from excavation and dispose of properly ▪ Store spoils, materials and equipment at least 2 feet from the edge of the excavation; prevent excessive loading of the excavation face. ▪ Inspect excavations (when personnel entry is required) daily, any time conditions change and document the inspection.
	2F) Slips/Trips/Falls	2F) Slips/Trips/Falls ▪ Provide sufficient egress (stairs, ladders, or ramps) when workers enter excavations over 4 feet in depth, and place these structures so that workers travel no more than 25 feet to reach ladders. Provide at least two means of exit for personnel working in excavations. ▪ Maintain minimum safe distance from the excavation and only approach the excavation on the short side.

MACTEC

Job Hazard Analysis - HASP Format

Job Title: Excavation and Backfilling **Date of Analysis:** 5/30/06

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	2G) Confined Space	2G) Confined Space ▪ Treat excavations over 4 feet deep as confined spaces and implement confined space permit entry procedure prior to entry. ▪ Monitor atmosphere in excavation for oxygen, flammable then toxic vapors, in that order. ▪ Implement confined space entry JHA.
	2H) Site Security	2H) Site Security ▪ Fill in excavation prior to leaving the site or provide barricades or fencing (able to withstand 200 lbs. of vertical pressure) to protect the excavation from the public and place warning signs on fence/barricade. ▪ Consider hiring a security guard ▪ If cover excavation with plywood or other material, ensure cover is labeled with the words “cover” or “hole.”
3). Backfilling of Soils	3A) Heavy Equipment	3A) Heavy Equipment ▪ See General Site Hazards (Heavy Equipment)
	3B) Cave-ins	3B) Cave-ins ▪ See 2E above.

MACTEC

Job Hazard Analysis – HASP Format

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

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

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

MACTEC

Job Hazard Analysis – HASP Format

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

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

MACTEC

Job Hazard Analysis – HASP Format

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

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

MACTEC

Job Hazard Analysis – HASP Format

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

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

MACTEC

Job Hazard Analysis – HASP Format

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

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

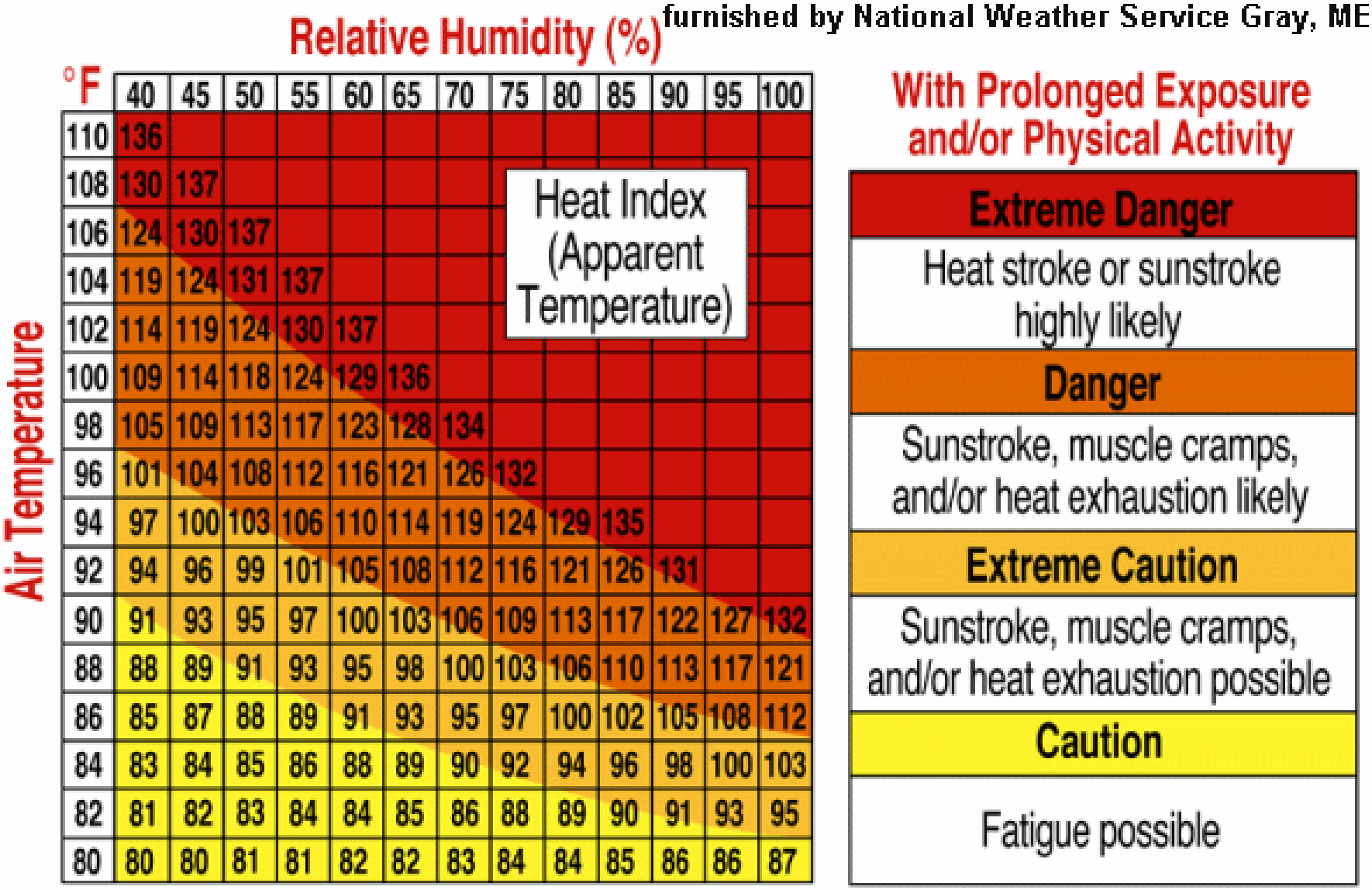
MACTEC

Job Hazard Analysis – HASP Format

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

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

furnished by National Weather Service Gray, ME



Wind Chill Chart

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

Frostbite Times — 30 minutes — 10 minutes — 5 minutes

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

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

Effective 11/01/01

MACTEC

Job Hazard Analysis - HASP Format

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

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

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Traveling/working in areas with potential Tick Bites –Example outdoor wooded areas or fields.	1. Lyme Disease, Rocky Mountain Spotted Fever, etc.	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.

MACTEC

Job Hazard Analysis – HASP Format

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

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

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

MACTEC

Job Hazard Analysis – HASP Format

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

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

MACTEC

Job Hazard Analysis – HASP Format

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

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

MACTEC

Job Hazard Analysis - HASP Format

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

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

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Prepare for sampling event	1A) Chemical exposure	1A) Chemical Exposure ▪ Read HASP and determine air monitoring and PPE needs.
2. Carrying equipment to site location	2A) Back or muscle strain	2A) Back or muscle strain ▪ Use proper lifting techniques when lifting pumps or generators ▪ Use mechanical aids if available ▪ Use 2 person lift for heavy items
3. Calibrate monitoring equipment	1A) Exposure to calibration gases	3A) Exposure to calibration gases ▪ Review equipment manuals ▪ Calibrate in a clean, well ventilated area
4. Preparing sampling location	4A) Contact with poisonous plants or the oil from poisonous plants	4A) Contact with poisonous plants or the oil from those plants: ▪ Look for signs of poisonous plants and avoid. ▪ Wear PPE as described in the HASP. ▪ Do not touch anything part of your body/clothing. ▪ Always wash gloves before removing them. ▪ Discard PPE in accordance with the HASP.
	4B) Contact with biting insects (i.e., spiders, bees, etc.)	4B) Contact with stinging/biting insects ▪ Discuss the types of insects expected at the Site and be able to identify them. ▪ Look for signs of insects in and around the well. ▪ Wear Level of PPE as described in the HASP. At a minimum, follow guidelines in the JHA “Insects Stings and Bites.” ▪ If necessary, wear protective netting over your head/face. ▪ Avoid contact with the insects if possible. ▪ Inform your supervisor and the Site Health and Safety Supervisor if you have any allergies to insects and insect bites. Make sure you have identification of your allergies with you at all times and appropriate response kits if applicable. ▪ Get medical help immediately if you are bitten by a black widow or brown recluse, or if you have a severe reaction to any spider bite or bee sting.
	4C) Exposure to hazardous Inhalation and contact with hazardous substances (VOC contaminated soil); flammable atmospheres.	4C) Exposure to hazardous substances ▪ Wear PPE as identified in HASP. ▪ Review hazardous properties of site contaminants with workers before sampling operations begin ▪ Monitor breathing zone air in accordance with HASP to determine levels of contaminants present. ▪ When decontaminating equipment wear additional eye/face protection over the safety glasses such as a face shield.
	4D) Back strain due to lifting or moving equipment to sampling locations	4D) Back strain ▪ Use mechanical aids when possible, if mechanical aids are not available, use two person lifts for heavy items. ▪ Use proper lifting techniques
	4E) Foot injuries from dropped equipment	4E) Foot Injuries ▪ Be aware when moving objects, ensure you have a good grip when lifting and carrying objects. ▪ Do not carry more than you can handle safely ▪ Wear steel toed boots

MACTEC

Job Hazard Analysis - HASP Format

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

Key Work Steps	Hazards/Potential Hazards	Safe Practices
5. Collecting soil samples	5A) Working around drill rigs	5A) See JHA - Drilling
	5B) Encountering underground or overhead utilities	5B) Have all utilities located.
	5C) Fire/Explosion/Contamination hazard from refueling generators	5C) Fire/Explosion/Contamination hazard from refueling generators ▪ Turn the generator off and let it cool down before refueling ▪ Segregate fuel and other hydrocarbons from samples to minimize contamination potential ▪ Transport fuels in approved safety containers. The use of containers other than those specifically designed to carry fuel is prohibited ▪ See JHA for Gasoline use
	5D) Electrocution	5D) Electrocution ▪ A ground fault circuit interrupter (GFCI) device must protect all AC electrical circuits. ▪ Use only correctly grounded equipment. Never use three-pronged cords which have had the third prong broken off. ▪ Make sure that the electrical cords from generators and power tools are not allowed to be in contact with water ▪ Do not stand in wet areas while operating power equipment ▪ Always make sure all electrically-powered sampling equipment is in good repair. Report any problems so the equipment can be repaired or replaced. ▪ When unplugging a cord, pull on the plug rather than the cord. ▪ Never do repairs on electrical equipment unless you are both authorized and qualified to do so.
	5E) Exposure to contaminants	5E) Exposure to Contaminants ▪ Stand up wind when sampling ▪ Monitor breathing zone with appropriate monitoring equipment (see HASP) ▪ Wear chemical resistant PPE as identified in HASP ▪ See section 4C) under Safe Practices above
	5F) Exposure to preservatives	5F) Exposure to preservatives ▪ Work in a well ventilated area, upwind of samples ▪ Wear chemical resistant PPE as identified in HASP ▪ Review MSDSs
	5G) Slips/trips/falls	5G) Slips/trips/falls ▪ Ground can become wet/muddy ▪ Wear good slip resistant footwear
	5H) Lifting Injury	5H) Lifting injury ▪ Use proper lifting techniques when carrying quantities of samples ▪ Use proper ergonomics when hand digging for samples
	5I) Eye injury	5I) Eye Injury ▪ Wear eye protection when using picks or similar devices to loosen soil

MACTEC

Job Hazard Analysis - HASP Format

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

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

MACTEC

Job Hazard Analysis - HASP Format

Job Title: 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.

MACTEC

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.

MACTEC

Job Hazard Analysis - HASP Format

Job Title: Surface Water/Sediment Sampling from the Shore **Date of Analysis:** 5/31/06

Minimum Recommended PPE*: Safety Boots/Shoes; Safety Glasses; Rubber boots; Waders; Personal Flotation Device;

*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.
	3C) Irate property owners, pets	3C) Irate property owners, pets ▪ Call property owners in advance. ▪ Check in to introduce yourself upon arrival. ▪ Be courteous and diplomatic
	3D) Crime	3D) Crime ▪ Do not enter areas where threats are present. ▪ Contract security where applicable. ▪ Use the buddy system. ▪ Maintain contact with support such as radio or cell phone.
	3E) Struck by traffic - sampling from a bridge or roadway.	3E) Struck by traffic - sampling from a bridge or roadway. ▪ Wear orange/yellow safety vest ▪ Use buddy system. ▪ Use traffic cones and a lookout. ▪ Attempt to sample away from the bridge if possible
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 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.

MACTEC

Job Hazard Analysis - HASP Format

Job Title: Surface Water/Sediment Sampling from the Shore **Date of Analysis:** 5/31/06

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	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)
	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.

MACTEC

Job Hazard Analysis - HASP Format

Job Title: Surface Water/Sediment Sampling from the Shore **Date of Analysis:** 5/31/06

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	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.
	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.

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.

MACTEC

Job Hazard Analysis - HASP Format

Job Title: Geoprobe **Date of Analysis:** 4/21/06

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

*See HASP for all required PPE

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Drive Geoprobe onto site	1A) Malfunction of vehicle/equipment	1A) Drivers shall perform a pre-operational check of equipment, read and be familiar with any operator's manual. ▪ Report all needed repairs promptly. ▪ Operators shall not use defective/unsafe equipment.
	1B) Wreck of Geoprobe while being driven	1B) Wreck of Geoprobe while being driven ▪ All drivers shall be properly licensed. ▪ Supervisors shall verify that drivers are capable and qualified on each type of equipment before allowing the equipment to be used unsupervised. ▪ Keep wind shields, windshield wipers, side mirrors and side windows clean ▪ Drivers shall conduct a pre-operation vehicle safety check ▪ Drivers shall plan ahead to minimize or eliminate the need for backing. Always check to the rear before backing and use an observer when available. If an observer is not available, the driver shall walk around the vehicle to make sure rear is clear prior to backing. ▪ Seat belts shall be worn when driving by driver and passengers. ▪ Choose the safest location possible to park equipment. Avoid parking in blind spots of other equipment. ▪ Adjust vehicle speed for load and weather. Tire chains should be utilized as dictated by weather conditions. ▪ When operating a vehicle off the roadway, be aware of possible hidden objects in the grass and unstable terrain. ▪ Never allow anyone between truck and trailer when backing to hook trailer ▪ Perform periodic checks of equipment on long trips to assure the load is secure. ▪ Do not leave equipment unattended with the engine running. Shut off engine and set the parking brake when equipment is not in use.
2. Loading/unloading of equipment	2A) Crush and pinch points created when loading/unloading equipment 2B) Heavy lifting, twisting, bending 2C) Slip, trips and falls	2A) Crush and pinch points created when loading/unloading equipment ▪ Be aware of crushing and pinching hazards when loading, unloading and fastening down equipment. ▪ Make sure cargo is properly loaded and secured. ▪ Wear protective equipment consistent with the hazard (hard hats, safety glasses, leather gloves, safety shoes, etc.) 2B) Size up the load, utilize help for heavy items, split loads as necessary. Use proper body mechanics and ergonomic techniques. 2C) Keep walking area clear. Proper housekeeping.
3. Geoprobe operation.	3A) Vehicle movement/ unstable 3B) Crushing injuries, pinch points, entanglement and flying particles, 3C) Noise 3D) slip trips and falls, 3E) material under stress, equipment limitations, rope or cable blocks, hydraulic leaks 3F) utility lines, 3G) overhead loads, 3H) lifting 3I) Chemical exposure .	Geoprobe operation. Read Owner's Manual. 3A) Always apply the parking brake and shut off engine before exiting the vehicle. • Ensure back up alarm is operational. • Complete a visual inspection of the equipment prior to operation. Replace or repair equipment if necessary. Complete a checklist to document inspections and corrective actions required. • Keep body parts clear of probe foot. • Be familiar with Emergency kill switch and controls. Test prior to probing. • When on sloped surface position the unit parallel to the slope with the control on the up hill side. • Use caution on soft or loose surface. Be aware of the weight of loaded vehicle.

MACTEC

Job Hazard Analysis - HASP Format

Job Title: Geoprobe **Date of Analysis:** 4/21/06

Key Work Steps	Hazards/Potential Hazards	Safe Practices
		• Be aware of weather and windy conditions. Do not operate during lighting storm or high winds. 3B) Heed all Caution, Warning or Danger decals on machine. • Ensure everyone is clear of moving parts. • Designate only one experienced operator to avoid unexpected engagement. • Operate only from the control side. Do not reach across operating probe. • Avoid placing your hands on top of the tool string when raising/lowering the hammer or swinging/ folding probe assembly. • DO not wear loose clothing. Tie back hair when operating equipment. • PPE – safety shoes, hard hat, safety glasses, hearing protection, gloves. Optional Tyvek or coveralls. 3C) PPE – hearing protection. 3D) Maintain an orderly and clean site. • Housekeeping. • Barricade or establish work zones to minimize unauthorized entry. • Adequate lighting 3E) Know the capacities, equipment limitations and acceptable operating loads. Follow the equipment operator's manual and proper maintenance requirements. • Stand clear of potential release of energy. Keep body part clear of moving parts. • Use the correct tool for the job. • Limit the rate of the hammer lowering while advancing the tool string to avoid raising the probe foot more than 6 inches off the ground surface. • In the event problem or binding, the operator should release all control levers to neutral. • Inspect hydraulic lines. Repair or replace damaged hoses. 3F) Be aware of surroundings. Establish safe "dig" zones. Contact Dig Safe or "one call" system to mark underground utilities or tanks. • Before moving onto a site, evaluate height restrictions due to overhead utilities and vegetation. • Borings to be located a minimum of 10 feet from overhead lines. • Do not drive the machine with the mast extended. 3G) Remain alert. Establish work zone to minimize workers under overhead loads. Avoid sudden jerks or overloading. Check load for balance and appropriate support prior to hoisting. 3H) Use mechanical means to lift heavy loads and removing rod. 3I) Don appropriate PPE for chemicals of concern. Work from upwind. Be aware or combustion fumes if equipment has auxiliary power. Practice good hygiene by washing hands, and no eating/smoking within the exclusion zone.
4. Operational area	4A) adverse weather conditions (temperature extremes), 4B) uneven terrain, 4C) poisonous plants/snakes/insects hazards	4A) Keep a weather eye. Monitor the weather forecast and actual conditions. • Wear appropriate clothing that does not restrict, cause over heat or is too loose. • Be aware of muddy conditions or puddles. 4B) Be aware of drop-offs, uneven ground and potential hidden objects which may cause loss of control when maneuvering rigs or create unstable drill set-ups. In heavily wooded area, scout to locate hidden objects. Use care when walking. 4C) Be aware of poisonous plants, insects, snakes, animals and animal waste products and carcasses. Wear long sleeve shirts, gloves, and high top boots when hazards cannot be avoided. Proper first aid supplies, insect repellents shall accompany field crews.

MACTEC

Job Hazard Analysis - HASP Format

Job Title: Geoprobe **Date of Analysis:** 4/21/06

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	4D) Contaminated soils, buried power or gas lines, landfills and containment of spills	4D) Contaminated soils, buried power or gas lines, landfills and containment of spills ▪ During drilling operations, always be aware of the possibility of encountering potentially hazardous materials, such as petroleum hydrocarbons, herbicides, pesticides, chemical manufacturing by-products or solid waste materials. ▪ In the event that any unknown or questionable materials are encountered, then the drilling operations are to be suspended immediately until further instructions are received from supervision. ▪ Do not handle any suspected contaminated materials unless trained to do so and proper protective methods are followed. ▪ During drilling operations, always be aware of the possibility of striking an unlocated or improperly located gas or power line. ▪ In the event a buried utility line is struck, drilling operations are to be suspended **immediately**. - If the utility line is electric, keep personnel at least 10 feet from all metal surfaces connected with the drill rig. - If the utility is gas, then the area is to be evacuated and secured. Immediate notification to the utility company is MANDATORY. ▪ In the event of a gas or oil spill, the proper authorities are to be contacted immediately so that containment operations can be implemented.
5. Mix grout on site and fill/place in hole between the well pipe and bore hole wall	5A) Lifting 5B) Chemical exposure	5A) Size the load of materials to be moved and utilize appropriate help for lifting and moving. Use proper ergonomic and body mechanics to move materials (bags of grout, etc.). Use mechanical mixer for large quanties of gourt. 5B) PPE – Safety glasses, safety shoes, gloves, optional tyvek/coveralls.
6. Cut PVC pipe off at determined height with a hand saw	6A) cutting of hand with hand saw	6A) Be aware of where hands are placed prior and during cutting with hand saw
7. Driving drilling rig offsite.	22A) Reference item # 1	22A) Reference item #1.

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Job Hazard Analysis - HASP Format

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

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

Key Work Steps	Hazards/Potential Hazards	Safe Practices
1. Mobilization	3A) See JHA Mobilization/Demobilization/Site Preparation	1A) See JHA Mobilization/Demobilization/Site Preparation
2. General Site Hazards	2A) See JHA Field Work - General	2A) See JHA Field Work - General
	2B) Chemical exposure	2B) Chemical Exposure ▪ Read HASP and determine air monitoring and PPE needs.
3. Calibrate monitoring equipment	4A) Exposure to calibration gases	4A) Exposure to calibration gases ▪ Review equipment manuals ▪ Calibrate in a clean, well ventilated area
4. Opening the well cap, taking water level readings	5A) Contact with poisonous plants or the oil from poisonous plants	5A) Contact with poisonous plants or the oil from those plants: ▪ Look for signs of poisonous plants and avoid. ▪ Ensure all field workers can identify the plants. Mark identified poisonous plants with spray paint if working at a fixed location. ▪ Wear PPE as described in the HASP. ▪ Do not touch any part of your body/clothing. ▪ Always wash gloves before removing them. ▪ Discard PPE in accordance with the HASP. ▪ Use commercially available products such as Ivy Block or Ivy Wash as appropriate.
	5B) Contact with biting insects (i.e., spiders, bees, etc.) which may have constructed a nest in the well cap/well.	5B) Contact with stinging/biting insects ▪ Discuss the types of insects expected at the Site and be able to identify them. ▪ Look for signs of insects in and around the well. ▪ Wear Level of PPE as described in the HASP. At a minimum, follow guidelines in the JHA "Insects Stings and Bites." ▪ If necessary, wear protective netting over your head/face. ▪ Avoid contact with the insects if possible. ▪ Inform your supervisor and the Site Health and Safety Supervisor if you have any allergies to insects and insect bites. Make sure you have identification of your allergies with you at all times and appropriate response kits if applicable. ▪ Get medical help immediately if you are bitten by a black widow or brown recluse, or if you have a severe reaction to any spider bite or bee sting.
	5C) Exposure to hazardous Inhalation and contact with hazardous substances (VOC contaminated groundwater/ soil); liquid splash; flammable atmospheres.	5C) Exposure to hazardous substances ▪ Wear PPE as identified in HASP. ▪ Review hazardous properties of site contaminants with workers before sampling operations begin ▪ Immediately monitor breathing zone after opening well to determine exposure and verify that level of PPE is adequate – see Action Levels in HASP ▪ Monitor headspace in well. After the initial headspace reading (if required by the Work Plan), allow the well to vent for several minutes before obtaining water level and before sampling. ▪ When decontaminating equipment wear additional eye/face protection over the safety glasses such as a face shield.
	5D) Back strain due to lifting bailers or pumps and from moving equipment to well locations	5D) Back strain ▪ Use mechanical aids when possible, if mechanical aids are not available, use two person lifts for heavy items. ▪ Use proper lifting techniques

MACTEC

Job Hazard Analysis - HASP Format

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

Key Work Steps	Hazards/Potential Hazards	Safe Practices
	5E) Foot injuries from dropped equipment	5E) Foot Injuries ▪ Be aware when moving objects, ensure you have a good grip when lifting and carrying objects. ▪ Do not carry more than you can handle safely ▪ Wear Steel toed boots
5. Collecting water samples	6A) Fire/Explosion/Contamination hazard from refueling generators	6A) Fire/Explosion/Contamination hazard from refueling generators ▪ Turn the generator off and let it cool down before refueling ▪ Segregate fuel and other hydrocarbons from samples to minimize contamination potential ▪ Transport fuels in approved safety containers. The use of containers other than those specifically designed to carry fuel is prohibited ▪ See JHA for Gasoline use
	6B) Electrocution	6B) Electrocution ▪ A ground fault circuit interrupter (GFCI) device must protect all AC electrical circuits. ▪ Use only correctly grounded equipment. Never use three-pronged cords which have had the third prong broken off. ▪ Make sure that the electrical cords from generators and power tools are not allowed to be in contact with water ▪ Do not stand in wet areas while operating power equipment ▪ Always make sure all electrically-powered sampling equipment is in good repair. Report any problems so the equipment can be repaired or replaced. ▪ When unplugging a cord, pull on the plug rather than the cord. ▪ Never do repairs on electrical equipment unless you are both authorized and qualified to do so.
	6C) Exposure to contaminants	6C) Exposure to Contaminants ▪ Stand up wind when sampling ▪ Monitor breathing zone with appropriate monitoring equipment (see HASP) ▪ Wear chemical resistant PPE as identified in HASP ▪ See section 4C) under Safe Practices above
	6D) Infectious water born diseases	6D) Infectious water born diseases ▪ Wear chemical resistant gloves and other PPE – as identified in HASP ▪ Prevent water from contacting skin ▪ Wash exposed skin with soap and water ASAP after sampling event ▪ Ensure that all equipment is adequately decontaminated using a 10% bleach solution
	6E) Exposure to water preservatives	6E) Exposure to water preservatives ▪ Work in a well ventilated area, upwind of samples ▪ Wear chemical resistant PPE as identified in HASP ▪ When preserving samples always add acid to water, avoid the opposite. ▪ See JHA Acids - Sampling
	6F) Slips/trips/falls	6F) Slips/trips/falls ▪ Ground can become wet/muddy, created by spilled water ▪ Place all purged water in drums for removal ▪ Wear good slip resistant footwear
	6G) Repetitive Motion and other Ergonomic Issues	6G) Ergonomic Issues ▪ Use mechanical means where possible to raise and lower equipment into well. ▪ Alternate raising and lowering equipment between field sampling team members, and alternate bailing the well. ▪ Use safe lifting techniques.

MACTEC

Job Hazard Analysis - HASP Format

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

Key Work Steps	Hazards/Potential Hazards	Safe Practices
6. Sample Processing	7A) Contaminated water	7A) Contaminated water ▪ Wear appropriate PPE as identified in HASP ▪ Decontaminate outside of bottles ▪ Prevent water from contacting skin ▪ Work in well ventilated area – upwind of samples ▪ Waste will be returned to the operation office for storage and disposal
7. Shipping Samples	8A) Freeze burns, back strain, hazardous chemical exposure, sample leakage	8A) Freeze burns, back strain, hazardous chemical exposure, sample leakage ▪ Wear appropriate chemical resistant gloves as identified in HASP. ▪ Wear leather or insulated gloves when handling dry ice. ▪ Follow safe lifting techniques – get help lifting heavy coolers. ▪ Samples that contain hazardous materials under the DOT definition, must be packaged, manifested and shipped by personnel that have the appropriate DOT HAZMAT training.

MSDS Number: **S4034** * * * * * *Effective Date:* ***07/07/04*** * * * * * *Supercedes:* ***05/11/04***

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.

SODIUM HYDROXIDE

1. Product Identification

Synonyms: Caustic soda; lye; sodium hydroxide solid; sodium hydrate
CAS No.: 1310-73-2
Molecular Weight: 40.00
Chemical Formula: NaOH
Product Codes:
J.T. Baker: 1508, 3717, 3718, 3721, 3722, 3723, 3728, 3734, 3736, 5045, 5565
Mallinckrodt: 7001, 7680, 7708, 7712, 7772, 7798

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Sodium Hydroxide	1310-73-2	99 - 100%	Yes

3. Hazards Identification

Emergency Overview

POISON! DANGER! CORROSIVE. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED. CAUSES BURNS TO ANY AREA OF CONTACT.

REACTS WITH WATER, ACIDS AND OTHER MATERIALS.

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 Stripe (Store Separately)

Potential Health Effects

Inhalation:
Severe irritant. Effects from inhalation of dust or mist vary from mild irritation to serious damage of the upper respiratory tract, depending on severity of exposure. Symptoms may include sneezing, sore throat or runny nose. Severe pneumonitis may occur.
Ingestion:
Corrosive! Swallowing may cause severe burns of mouth, throat, and stomach. Severe scarring of tissue and death may result. Symptoms may include bleeding, vomiting, diarrhea, fall in blood pressure. Damage may appears days after exposure.
Skin Contact:
Corrosive! Contact with skin can cause irritation or severe burns and scarring with greater exposures.
Eye Contact:
Corrosive! Causes irritation of eyes, and with greater exposures it can cause burns that may result in permanent impairment of vision, even blindness.
Chronic Exposure:
Prolonged contact with dilute solutions or dust has a destructive effect upon tissue.
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.

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4. First Aid Measures

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:
Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician, immediately. Wash clothing before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

Note to Physician:
Perform endoscopy in all cases of suspected sodium hydroxide ingestion. In cases of severe esophageal corrosion, the use of therapeutic doses of steroids should be considered. General supportive measures with continual monitoring of gas exchange, acid-base balance, electrolytes, and fluid intake are also required.

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5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard. Hot or molten material can react violently with water. Can react with certain metals, such as aluminum, to generate flammable hydrogen gas.
Explosion:
Not considered to be an explosion hazard.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire. Adding water to caustic solution generates large amounts of heat.
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.

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6. Accidental Release Measures

Ventilate area of leak or spill. Keep unnecessary and unprotected people away from area of spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Pick up and place in a suitable container for reclamation or disposal, using a method that does not generate dust. Do not flush caustic residues to the sewer. Residues from spills can be diluted with water, neutralized with dilute acid such as acetic, hydrochloric or sulfuric. Absorb neutralized caustic residue on clay, vermiculite or other inert substance and package in a suitable container for disposal.
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.

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7. Handling and Storage

Keep in a tightly closed container. Protect from physical damage. Store in a cool, dry, ventilated area away from sources of heat, moisture and incompatibilities. Always add the caustic to water while stirring; never the reverse. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product. Do not store with aluminum or magnesium. Do not mix with acids or organic materials.

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8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
- OSHA Permissible Exposure Limit (PEL):
2 mg/m3 Ceiling
- ACGIH Threshold Limit Value (TLV):
2 mg/m3 Ceiling

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 half facepiece particulate respirator (NIOSH type N95 or better filters) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest.. A full-face piece particulate respirator (NIOSH type N100 filters) 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 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.

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.

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9. Physical and Chemical Properties

Appearance:
White, deliquescent pellets or flakes.

Odor:
Odorless.

Solubility:
111 g/100 g of water.

Specific Gravity:
2.13

pH:
13 - 14 (0.5% soln.)

% Volatiles by volume @ 21C (70F):
0

Boiling Point:
1390C (2534F)

Melting Point:
318C (604F)

Vapor Density (Air=1):
> 1.0
Vapor Pressure (mm Hg):
Negligible.
Evaporation Rate (BuAc=1):
No information found.

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10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Very hygroscopic. Can slowly pick up moisture from air and react with carbon dioxide from air to form sodium carbonate.
Hazardous Decomposition Products:
Sodium oxide. Decomposition by reaction with certain metals releases flammable and explosive hydrogen gas.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Sodium hydroxide in contact with acids and organic halogen compounds, especially trichloroethylene, may causes violent reactions. Contact with nitromethane and other similar nitro compounds causes formation of shock-sensitive salts. Contact with metals such as aluminum, magnesium, tin, and zinc cause formation of flammable hydrogen gas. Sodium hydroxide, even in fairly dilute solution, reacts readily with various sugars to produce carbon monoxide. Precautions should be taken including monitoring the tank atmosphere for carbon monoxide to ensure safety of personnel before vessel entry.
Conditions to Avoid:
Moisture, dusting and incompatibles.

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11. Toxicological Information

Irritation data: skin, rabbit: 500 mg/24H severe; eye rabbit: 50 ug/24H severe; investigated as a mutagen.

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

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Sodium Hydroxide (1310-73-2)	No	No	None

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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 handled as hazardous waste and sent to 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: SODIUM HYDROXIDE, SOLID
Hazard Class: 8
UN/NA: UN1823
Packing Group: II
Information reported for product/size: 300LB

International (Water, I.M.O.)

Proper Shipping Name: SODIUM HYDROXIDE, SOLID
Hazard Class: 8
UN/NA: UN1823
Packing Group: II
Information reported for product/size: 300LB

15. Regulatory Information

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

Ingredient	TSCA	EC	Japan	Australia
Sodium Hydroxide (1310-73-2)	Yes	Yes	Yes	Yes

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

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Sodium Hydroxide (1310-73-2)	Yes	Yes	No	Yes

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

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Sodium Hydroxide (1310-73-2)	No	No	No	No

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

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)

Sodium Hydroxide (1310-73-2)	1000	No	No

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

Australian Hazchem Code: 2R
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.

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16. Other Information

NFPA Ratings: Health: **3** Flammability: **0** Reactivity: **1**
Label Hazard Warning:
POISON! DANGER! CORROSIVE. MAY BE FATAL IF SWALLOWED. HARMFUL IF INHALED. CAUSES BURNS TO ANY AREA OF CONTACT. REACTS WITH WATER, ACIDS AND OTHER MATERIALS.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Do not breathe dust.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. 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 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: 3.
Disclaimer:
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TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.

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Prepared by: Environmental Health & Safety
Phone Number: (314) 654-1600 (U.S.A.)

MSDS Number: **H3886** * * * * * *Effective Date:* ***02/16/06*** * * * * * *Supercedes:* ***05/07/03***

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.

HYDROCHLORIC ACID (10%-33%)

1. Product Identification

Synonyms: This MSDS applies to the concentrated standard used to make laboratory solutions and any solution that contains more than 10% but less than 33% Hydrochloric acid. For diluted product, see MSDS for Hydrochloric Acid (less than 10%).
CAS No.: 7647-01-0
Molecular Weight: 36.46
Chemical Formula: HCl in H2O
Product Codes:
J.T. Baker: 0323, 0327, 0365, 4654, 4657, 5618, 5619
Mallinckrodt: 2608, 2625, H151, H168, V035

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Hydrogen Chloride	7647-01-0	10 - 33%	Yes
Water	7732-18-5	67 - 90%	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 INHALED.

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

Health Rating: 3 - Severe (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:
Corrosive! Inhalation of vapors can cause coughing, choking, inflammation of the nose, throat, and upper respiratory tract, and in severe cases, pulmonary edema, circulatory failure, and death.
Ingestion:
Corrosive! Swallowing hydrochloric acid can cause immediate pain and burns of the mouth, throat, esophagus and gastrointestinal tract. May cause nausea, vomiting, and diarrhea, and in severe cases, death.
Skin Contact:
Corrosive! Can cause redness, pain, and severe skin burns. Concentrated solutions cause deep ulcers and discolor skin.
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. Long term exposures seldom occur due to the corrosive properties of the acid.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye disease may be more susceptible to the effects of this substance.

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4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention immediately.
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.

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5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard. May react with metals or heat to release flammable hydrogen gas.
Explosion:
Not considered to be an explosion hazard.
Fire Extinguishing Media:
Water or water spray. Neutralize with soda ash or slaked lime.
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 hydrochloric acid. Stay away from ends of tanks. Cool tanks with water spray until well after fire is out.

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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® acid neutralizers are recommended for spills of this product.

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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. 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.

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8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
For Hydrochloric acid:
- OSHA Permissible Exposure Limit (PEL):
5 ppm (Ceiling)
- ACGIH Threshold Limit Value (TLV):
2 ppm (Ceiling), A4 Not classifiable as a human carcinogen

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 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. 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.
Skin Protection:
Rubber or neoprene gloves and additional protection including impervious boots, apron, or coveralls, as needed in areas of unusual exposure 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.

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9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Pungent odor.
Solubility:
Infinitely soluble.
Density:
1.05 @ 15C (59F)
pH:
For HCL solutions: 0.1 (1.0 N), 1.1 (0.1 N), 2.02 (0.01 N)
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
101 - 103C (214 - 217F)
Melting Point:
No information found.
Vapor Density (Air=1):
No information found.

Vapor Pressure (mm Hg):
No information found.
Evaporation Rate (BuAc=1):
No information found.

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10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
When heated to decomposition, emits toxic hydrogen chloride fumes and will react with water or steam to produce heat and toxic and corrosive fumes. Thermal oxidative decomposition produces toxic chlorine fumes and explosive hydrogen gas.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
A strong mineral acid, concentrated hydrochloric acid is highly reactive with strong bases, metals, metal oxides, hydroxides, amines, carbonates and other alkaline materials. Incompatible with materials such as cyanides, sulfides, sulfites, and formaldehyde.
Conditions to Avoid:
Heat, direct sunlight.

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11. Toxicological Information

Hydrochloric acid: Inhalation rat LC50: 3124 ppm/1H; Oral rabbit LD50: 900 mg/kg. Investigated as a tumorigen, mutagen, reproductive effector.

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

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Hydrogen Chloride (7647-01-0)	No	No	3
Water (7732-18-5)	No	No	None

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12. Ecological Information

Environmental Fate:
When released into the soil, this material is not expected to biodegrade. When released into the soil, this material may leach into groundwater.
Environmental Toxicity:
This material is expected to be toxic to aquatic life.

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13. Disposal Considerations

Whatever cannot be saved for recovery or recycling should be handled as hazardous waste and sent to 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: HYDROCHLORIC ACID
Hazard Class: 8
UN/NA: UN1789
Packing Group: II
Information reported for product/size: 200L

International (Water, I.M.O.)

Proper Shipping Name: HYDROCHLORIC ACID
Hazard Class: 8
UN/NA: UN1789
Packing Group: II
Information reported for product/size: 200L

15. Regulatory Information

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

Ingredient	TSCA	EC	Japan	Australia
Hydrogen Chloride (7647-01-0)	Yes	Yes	Yes	Yes
Water (7732-18-5)	Yes	Yes	Yes	Yes

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

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Hydrogen Chloride (7647-01-0)	Yes	Yes	No	Yes
Water (7732-18-5)	Yes	Yes	No	Yes

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

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Hydrogen Chloride (7647-01-0)	5000	500*	Yes	No
Water (7732-18-5)	No	No	No	No

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

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Hydrogen Chloride (7647-01-0)	5000	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: No          (Mixture / Liquid)
```

Australian Hazchem Code: 2R
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: **0**
Label Hazard Warning:
POISON! DANGER! CORROSIVE. LIQUID AND MIST CAUSE SEVERE BURNS TO ALL BODY TISSUE. MAY BE FATAL IF SWALLOWED OR INHALED.
Label Precautions:
Do not get in eyes, on skin, or on clothing.
Avoid breathing vapor or mist.
Keep container closed.
Use with adequate ventilation.
Wash thoroughly after handling.
Label First Aid:
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 case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician.
Product Use:
Laboratory Reagent.
Revision Information:
No Changes.
Disclaimer:
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