FINAL
VAPOR INVESTIGATION WORK PLAN
EUGENE'S DRY CLEANERS
SITE NO. 1-52-157

WORK ASSIGNMENT NO. D004434-27

Prepared for:

New York State Department of Environmental Conservation
Albany, New York

Prepared by:

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

Project Number: 3612072087

AUGUST 2007

FINAL
VAPOR INVESTIGATION WORK PLAN
EUGENE'S DRY CLEANERS
SITE NO. 1-52-157

WORK ASSIGNMENT NO D004434-27

Prepared for:

New York State Department of Environmental Conservation
Albany, New York

Prepared by:

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

Project Number: 3612072087

AUGUST 2007

Submitted by:

John W. Peterson, P.M.
Project Manager

Approved by:

Eric C. Sandin, C.G.
Site Manager

TABLE OF CONTENTS

LIST OF FIGURES

Figure

LIST OF TABLES

Table

GLOSSARY OF ACRONYMS AND ABBREVIATIONS

ASP	Analytical Services Protocol
bgs	below ground surface
DQOs	Data Quality Objectives
DUSR	Data Usability Summary Report
ELAP	Environmental Laboratory Approval Program
EPA	Environmental Protection Agency
HASP	Health and Safety Plan
IDW	Investigation Derived Wastes
MACTEC	MACTEC Engineering and Consulting, P.C.
ml	milliliters
NTU	nephelometric turbidity units
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
PCE	tetrachloroethene
PID	photoionization detector
PMWP	Project Management Work Plan
ppm	parts per million
QA	Quality Assurance
QAPjP	Quality Assurance Project Plan
QAPP	Quality Assurance Program Plan
QC	Quality Control

GLOSSARY OF ACRONYMS AND ABBREVIATIONS (CONTINUED)

Site	Eugene's Dry Cleaners Site
SVE	Soil Vapor Extraction System
SVIE	Soil Vapor Intrusion Evaluation
TCE	Trichloroethene
TCL	target compound list
USEPA	United States Environmental Protection Agency
VOCs	Volatile Organic Compounds
VI	Vapor Investigation
WA	Work Assignment
WP	Work Plan

1.0 INTRODUCTION

MACTEC Engineering and Consulting, P.C. (MACTEC), under contract to the New York State Department of Environmental Conservation (NYSDEC), is submitting this Work Plan (WP) to the New York State Department of Environmental Conservation (NYSDEC). This WP addresses the Vapor Investigation (VI) at the Eugene's Dry Cleaners Site (Site) (Site # 1-52-157) in the town of Babylon, Suffolk County (see Figure 1.1 for Site Location). This WP has been prepared in response to NYSDEC Work Assignment (WA) No. D004434-27, dated March 28, 2007, and with the April 2006 Superfund Standby Contract No. D004434 between the NYSDEC and MACTEC.

The VI Project Management Work Plan (PMWP), submitted under separate cover, provides cost budgets for WA Tasks 1 through 6, including budget estimates for subcontractors and other direct field investigation costs. The PMWP also provides project organization, staffing plan, and schedule for this WA.

Historical information provided by NYSDEC indicates that soil and groundwater at the Site were contaminated by chlorinated solvents, particularly tetrachloroethene (PCE) and its degradation products. Various investigations and remedial efforts were completed. In February 2005, the Site was included on the List of Inactive Hazardous Waste Sites with Pre-2003 Remedial Decisions where Disposal of Chlorinated Hydrocarbons Occurred. A Soil Vapor Intrusion Evaluation (SVIE) was performed in 2006 and detected elevated chlorinated compounds in soil vapor. NYSDEC has required additional investigation to determine the source of elevated soil vapor concentrations, evaluate potential vapor impacts to surrounding structures and to assess and design vapor mitigation system(s).

This WP represents the culmination of Work under Task 1. During Task 1, MACTEC conducted a site visit to develop information for the technical scope of work and associated field operations/sampling plan for the Site (see Section 3). Excerpts from the NYSDOH Guidance for Evaulating Soil Vapor Intrusion are provided in Appendix A. The site-specific Quality Assurance Project Plan (QAPjP) is presented in Appendix B and a site-specific Health and Safety Plan (HASP) is presented in Appendix C. The HASP covers site-specific activities at the Eugene's Dry Cleaners Site and three additional Sites where work is planned concurrently.

Resources used to prepare this plan include: (1) information provided in the WA, (2) appropriate guidelines in the NYSDEC Draft DER-10 Guidance (NYSDEC, 2002), (3) results of previous investigations, (4) Program HASP (MACTEC, 2005) and (5) Quality Assurance Program Plan (QAPP) (ABB ES, 1994).

2.0 SITE LOCATION AND HISTORY

The Eugene's Dry Cleaner Site is located at 54 East Main Street in the Town of Babylon, Suffolk County and occupies approximately 0.1 acres. The site consists of a single-story masonry building with a sub-level, situated on a soil supported concrete slab. The building is part of a property that contains three stores. Eugene's Dry Cleaner was located along the eastern side of the structure, a space that is currently occupied by a nail salon.

The site had been a dry cleaning operation for several years and ceased operation in 1998. In December 1994, while responding to a fuel oil spill, PCE was detected in the soil located in a basement sump. This contamination was believed to be a result of the facility discharging a PCE/water mixture to the basement sump. In July 1998, a focused Remedial Investigation (RI) was performed by NYSDEC to evaluate the basement and groundwater conditions. Elevated contaminant concentrations were detected at the sump and beneath the slab-on-grade at the site. An Interim Remedial Measure (IRM) was performed in October 1998 in which the basement was power washed and approximately three cubic yards of material was removed from the sump.

In February 2005, the site was included on the List of Inactive Hazardous Waste Sites with Pre-2003 Remedial Decisions where Disposal of Chlorinated Hydrocarbons Occurred. In April 2006, a SVIE was conducted. The SVIE included groundwater grab samples, temporary soil vapor points, and Site indoor air samples. Elevated levels of PCE and Trichloroethene (TCE) were detected within the basement air and in the soil vapor at multiple locations outside the Site building.

3.0 SCOPE OF WORK

The SVIE completed in 2006 detected chlorinated compounds in soil gas beneath the Site at significant levels [greater than 5,200 ug/m3 (PCE) and 440 ug/m3 (TCE)]. Co-located groundwater grab samples from temporary wells reported low concentrations of PCE. Samples of basement air collected from the onsite structure contained levels of TCE (>1.5 ug/m3) and PCE (>250 ug/m3) that are above New York State Department of Health (NYSDOH)-guidance (NYSDOH, 2006).

Based on the 2006 findings, NYSDEC has required additional characterization to evaluate the source of the soil gas impacts and sample vapor at nearby structures. MACTEC is proposing a phased investigation approach with follow-up sampling activities including downgradient soil gas, co-located groundwater grab samples and additional structure sampling, if necessary.

- Task 1 is represented by this WP.
- Task 2 includes environmental samples that will be collected to document current condition and provide data needed to implement remedial designs.
- Task 3 consists of indoor air and sub-slab vapor sampling at nearby structures.
- Task 4 includes budget to evaluate and design mitigation systems.
- Task 5 provides for characterization and disposal of any investigation-derived wastes.
- Task 6 presents reporting activities.

Details specific to these tasks were stated in the WA. Based on information developed during Task 1, MACTEC has modified some WA tasks as described in the sections below.

The following sections briefly describe the work elements for the tasks listed above. Figure 3.1 includes the locations of proposed environmental and structure samples and Tables 3.1 and 3.2 summarize the sampling and analytical program. The VI will be conducted in accordance with the specifications presented in the QAPP (ABB-ES, 1994) and the site-specific QAPjP, included as Appendix B of this WP. Quality Control (QC) and Quality Assurance (QA) procedures for sample handling and sample shipment are presented in Section 5.0 of the QAPP. QA/QC sample frequencies are presented in table 3.2. Health and Safety procedures for on-site activities are presented in the Program HASP (MACTEC, 2005) and the site specific HASP is included as

Appendix C to this WP. Soil vapor and indoor air samples will be analyzed by Con-Test Laboratory of E Longmeadow, MA, a NYSDOH-approved and Environmental Laboratory Approval Program (ELAP)-certified laboratory. Soil and groundwater samples will be analyzed by Mitkem Corporation of Warwick, RI, also a NYSDOH-approved and ELAP-certified laboratory.

3.1 GENERAL FIELD ACTIVITIES

General field activities, including mobilization, health and safety, and decontamination, are described in the following subsections.

Mobilization. Upon receiving the NYSDEC authorization to begin fieldwork, MACTEC and its subcontractors will mobilize to the Site and begin the field program. Mobilization will include obtaining utility clearances, if applicable, and acquisition of the following:

- transportation to and from the Site;
- health and safety clothing and monitoring equipment;
- decontamination supplies and equipment; and
- sampling equipment.

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 C to this document. Based on available site information, MACTEC anticipates that the field activities will be conducted at Level D personal protection. Specific field investigation activities and required level of personal protection are set forth in the HASP. Criteria for upgrading or downgrading the specified level of personal protection are provided in the HASP. Additional health and safety requirements are set forth in the Program HASP (MACTEC, 2005). Should site conditions pose a threat to those present on-site, and/or should site conditions warrant an upgrade from Level D, as defined by the 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 per Subsection 4.3 of the QAPP and as outlined in the WA.

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 or equipment exhibit visual or olfactory evidence of contamination, fluids will be containerized for offsite disposal.

Investigation Derived Wastes (IDW). Soil cuttings and purge water from groundwater sampling will be contained in 55-gallon drums and disposed of off-site (see Task 5, Section 3.5).

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.

Air Monitoring. Ground invasive activities such as interior sub-slab vapor points and exterior soil borings, soil vapor points, and groundwater sampling will require monitoring for volatile organic compounds (VOCs). A PID will be used to assess ambient conditions and to monitor for any added volatiles during each invasive activity. The activities described in this WP are not expected to release VOCs or generate dust at levels that would pose a risk to the community. MACTEC will use common-sense measures to keep VOCs, dust, and odors to a minimum during the performance of all field work. For example, sub-slab soil vapor point sampling will include purging vapor into a syringe or other container instead of into the building interior space. A Community Air Monitoring Plan (CAMP) will be prepared if conditions are encountered that would require an upgrade to personal protective equipment or if the scope of invasive activities evolves to include larger

diameter borings than geoprobe or more extensive sub-slab penetration to investigate residual contamination at a release location.

Location Survey. MACTEC will develop a site plan (figure) using the most recent available public aerial photography. The plan will identify pertinent features such as buildings, roadways, fences, etc. MACTEC will locate sampling points and monitoring wells on the plan using Ground Positioning System (GPS) such as a Trimble XR or XT Sub-meter unit.

3.2 TASK 2 – ENVIRONMENTAL SAMPLES

MACTEC will use a Geoprobe® drilling system to install soil vapor implants, temporary microwells, and collect soil vapor, groundwater, and soil samples as specified in the following sections. The Geoprobe® pushes and/or hammers rods and probe tips into the subsurface for sample collection as described in Subsection 4.6 of the QAPP. Soil vapor samples will be collected consistent with the procedures and techniques described in the WA and the NYSDOH "Guidance for Evaluating Soil Vapor Intrusion in the State of New York, October 2006 (NYSDOH, 2006). Pertinent sections from the NYSDOH guidance document are included in Appendix A.

3.2.1 Soil Vapor Sampling

MACTEC will install soil vapor points at up to seven locations to establish permanent sampling points to assess residual subsurface contamination. The proposed locations of these points are shown on Figure 3.1 and described below:

DP-01	Upgradient of the Site along the north side of East Main Street;
DP-02	In the alley to the east of the former Eugene's Dry Cleaners building;
DP-03	In the alley to the east of the former Eugene's Dry Cleaners building;
DP-04	Along the south side of the Site building
DP-05	To the south of the Site building and near an existing dry well
DP-06	Southwest of the Site building near well PW-2
DP-07	Southeastern portion of the property at well PW-8

At each location, a small-diameter (1 to 1 ½ inch diameter) borehole will be created using direct-push drilling methods to evacuate soils using a macrocore sampler. Each boring will be advanced to the water table, projected at 8 feet below ground surface (bgs) or to refusal, if shallower. If shallow refusal is encountered, several attempts will be made at each location to advance the boring to the required depth. The retrieved soil profiles will be examined to evaluate soil conditions and identify water-saturated zones, if present. The open borehole will be sounded with a water level meter to determine if groundwater is infiltrating. The depth of the soil vapor implants will be determined in the field based on observed soil and groundwater conditions. The objective will be to install vapor points one to two feet above the water table. The projected depth of the 6-inch implants is 6.0 to 6.5 feet bgs, assuming a water table at 8 feet bgs.

Each Geoprobe implant will have a minimum 6-inch length with a double woven stainless steel wire screen. Glass beads will be used to create a sampling zone around the screen. The beads will extend one foot above the top of the implant screen. Bentonite slurry will be placed above the glass beads for distance of 3 feet to prevent outdoor air infiltration and the remainder of any open borehole will be backfilled with bentonite slurry or clean backfill. Inert Teflon tubing with cap will extend from the implant to the ground surface to permit sampling. The surface completion will include installation of a flush-to-the-ground roadbox with sealable cap.

Approximately one liter of soil gas, (slightly greater than three times the volume of the annular space of the screen pack plus the volume of the sample tubing), will be purged at a rate of less than 0.2 liters per minute using a personal air monitoring pump before collecting samples. During the soil gas purge, vapors will be screened with a PID. In addition, helium leak tests will be conducted at all locations to ensure samples are representative of sub-surface conditions and not outdoor ambient air. Helium tests will be conducted by encapsulating the sample point with a bucket sealed to the ground surface with hydrated bentonite. The encapsulated area will be filled with helium, but care will be taken not to pressurize the enclosure. The soil gas sample port will be tested for helium breakthrough with a portable monitoring device (e.g., Radiodetection MGD-2002 Multi Gas Meter) both before and after collection of the soil gas sample. If greater than 10 percent of the tracer gas is detected in the screening sample, the sample point seal will be enhanced and the procedure repeated. The soil gas samples will be collected with one-liter SUMMA®-type canisters with flow valves (set to approximately 20 minutes per sample). Flow into the canisters will be less than 0.2 liters per minute, as requested by the NYSDOH. Soil vapor samples will be analyzed by

Con-Test for analyses of VOCs by United States Environmental Protection Agency (USEPA) Method TO-15.

3.2.2 Geoprobe Groundwater Sampling

Groundwater grab samples will be collected at each location where MACTEC installs a new soil vapor sampling point (DP-01 to DP-07). The objective of the groundwater sampling is to assess potential concentrations of solvent contamination in shallow groundwater at the soil gas sampling locations to aid in the evaluation of the soil gas results. Based on historical Site records, water saturated soils are found a depths of approximately 8 feet bgs at the Site.

Grab samples will be collected using direct-push drilling methods to advance a boring to a planned depth of approximately two to six feet below the water table. Samples will be collected by installing a temporary small-diameter well or by using a discrete sampler such as a Hydropunch. The well may consist of one-inch PVC slotted wellscreen and riser or small diameter stainless steel wire wound screen that will be exposed to the aquifer, after being pushed to the desired depth interval. A check valve or geopump will be used for the collection of discrete groundwater samples. If possible, 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 (ml) per minute) to minimize potential volatilization. The sample collection depth will be determined based on observed field conditions. After sampling, each open borehole will be filled with bentonite or bentonite-cement grout as directed by MACTEC and the hole will be sealed at the surface using asphalt patch, as appropriate.

Groundwater samples will be analyzed by Mitkem for target compound list (TCL) VOCs using USEPA 8260 methods as described in the NYSDEC Analytical Services Protocol (ASP) of June 2000. Off-site laboratory analysis will include Category B deliverables

3.2.3 Geoprobe Soil Sampling

MACTEC will retrieve a soil profile at each soil Geoprobe soil vapor point location. Soil samples will be collected using a three or 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 from the ground surface to approximately two feet into the groundwater table. A PID will be used to screen soil samples for the presence of VOCs as each soil sample is removed from the sample collection tube. Samples will be described using the Unified Soil Classification System. The sample description and classification, PID reading, and boring observations will be recorded on the Field Data Record as discussed in Subsection 4.6 of the QAPP. Based on the PID readings and physical evidence such as color or odor, one sample from each boring location will be submitted for VOC analysis. Samples exhibiting the highest PID readings and physical evidence of contamination will be selected for analysis. In the absence of PID hits or visible contamination, a default depth of one to two feet bgs will be used to profile characterize conditions in surficial soils. Soil samples will be analyzed by Mitkem for VOCs using USEPA method 8260. Off-site laboratory analysis will include Category B deliverables.

3.2.4 Monitoring Well Groundwater Sampling

MACTEC will collect groundwater samples from six existing wells or piezometers (PW-1, PW-2, PW-3, PW-6, PW-8, and P-1). Prior to sampling, the wells will be sounded and water level measurements will be documented. Monitoring wells shall be purged a minimum of three well volumes. Groundwater samples will then be collected using low-flow sampling procedures described in Appendix B to achieve a turbidity of 50 nephelometric turbidity units (NTUs) or less during sampling. If a well exhibits low yield (e.g. continues to drawdown at 100 ml per minute), the well will be purged dry and a sample collected after the well recharges sufficiently. Each sample will be analyzed for TCL VOCs by Mitkem using Environmental Protection Agency (EPA) Method 8260.

3.3 TASK 3 – STRUCTURE SAMPLING

This section describes the scope of sampling and methods that will be used to collect samples from onsite and offsite structures. Structures that are proposed for sampling include the site building, a church hall located to the north of the Site, and retail businesses adjacent to the Site to the east and west.

MACTEC will collect air samples at the Site and at three structures surrounding the Site to provide data to evaluate the soil vapor intrusion pathway (Figure 3.1). The sampling approach for each structure includes:

- Completion of the NYSDOH Indoor Air Quality Questionnaire and Inventory,
- Collection of sub-slab soil vapor air samples, if floor is sealed,
- Collection of basement air samples and if warranted, collection of air samples from the overlying first livable floor (i.e., first floor), and
- Collection of an outdoor ambient air sample (a total of two ambient air samples are planned to document outside conditions in the neighborhood of the Site).

Additional soil and groundwater grab samples are proposed from the locations in the basement of the site building. The sampling scope at each structure is described below and presented on Table 3.1 and Table 3.2.

In the Site structure, samples will be collected from both the former Eugene's Dry Cleaners space and from an adjoining retail business (currently a surf shop). Sub-slab vapor samples will be collected from two locations in the basement space below the former dry cleaners and from one location in the adjacent business basement. At each of these locations, MACTEC will attempt to collect a soil, groundwater, and soil vapor sample. After drilling through the sub-slab, MACTEC will assess the nature of the underlying material and determine the appropriate media samples. The primary objective is to collect a soil vapor sample. If saturated soil conditions are present at the base of the slab, groundwater grab samples will be collected in place of vapor. If the water table is within approximately one or two feet of the base of the slab, MACTEC will collect soil and groundwater grab samples prior to installing a soil vapor point and obtaining a vapor sample. MACTEC will also examine conditions at the floor sump and collect a soil/sediment sample and/or water sample from the sump, as directed by NYSDEC. Basement air and first floor air samples will be collected from both the former dry cleaners and the adjacent retail shop within the site structure and one second floor air sample will be obtained above the former dry cleaners.

At the business located immediately to the west of the Site, MACTEC will collect a sample suite consisting of one sub-slab vapor sample, one basement air sample, and one first floor air sample.

At the church hall located to the north of the Site, MACTEC will collect a sample suite consisting of one sub-slab vapor sample, one basement air sample, and one first floor air sample.

At the business located immediately to the east of the Site, MACTEC will collect three sub-slab vapor samples, three corresponding basement air samples and one first floor air sample.

Structure sampling will be conducted in accordance with NYSDOH soil vapor intrusion guidance included in Appendix A (NYSDOH, 2006)

3.3.1 Indoor Air Questionnaire and Inventory Survey

Indoor air surveys and product inventories will be conducted at each residence or business sampled using the NYSDOH "Indoor Air Quality Questionnaire and Building Inventory" form, included in Attachment A. A MiniRae PID that measures parts per billion will be used to scan inventoried items that may be off-gassing VOCs. VOCs that are listed on the household container and are also included on the air sample analytical TCL will be noted on the inventory form, along with any PID readings. If any products that are inventoried list primary contaminants of concern (i.e. chlorinated solvents) as ingredients and exhibit positive PID results above background, and if the homeowner/resident allows, such containers will be removed from the home to an alternative location (i.e. garage or shed).

The completed surveys will include sketches of the structure layout and location of air and sub-slab samples.

3.3.2 Sub-slab Samples, Indoor Air, and Ambient Outdoor Air Samples

Sub-slab soil vapor samples will be collected from below each buildings concrete slab. A one-inch diameter hole will be drilled with a hammer drill two inches into the building floor. The hole will be continued with a 3/8-inch drill bit, until the building slab is penetrated. The hole will be continued approximately 3-inches below the slab. The hole will then be swept to remove drill cuttings/dust from the area. A permanent sub-slab vapor point will be constructed utilizing a stainless steel sample port and ¼-inch diameter Teflon tubing such that the sampling port and screw on cap is flush with the upper floor surface. Prior to sampling, three volumes of air will be

purged from the tubing with the PID or with a polyethylene syringe at a rate less than 200 ml/minute. A 6-liter SUMMA®-type canister with a 24-hour flow valve will be connected to the tubing. The laboratory will be required to provide certification of testing for each canister and flow valve.

Indoor air samples will be collected in 6-liter SUMMA®-type canisters from the basement level or crawlspace. Samples will be collected from approximately three to five feet above the floor level and set up with 24-hour flow valves.

A second indoor air sample will be collected from the first floor level (i.e. one sample will be collected from the first floor of occupied living space in the home/business). The second samples will also be collected from approximately three to five feet above the floor level, and set up with 24-hour flow valves.

Ambient air samples will be collected in 6-liter SUMMA®-type canisters from the vicinity of the homes/businesses being sampled for indoor air and sub-slab vapor VOC contamination. Samples will be collected from approximately three to five feet above ground surface. Ambient air samples will be set up with 24-hour flow valves. MACTEC anticipates that a total of two ambient air samples will be collected on successive sampling days.

For all air samples, the time of sample collection, canister vacuum (in inches Hg), weather conditions, and barometric pressure will be recorded in the field log book. After approximately 24-hours, the flow valves will be shut off. The time, remaining vacuum in the canister, and barometric pressure will be noted in the field log book. The samples will be analyzed by Con-Test for VOCs via USEPA Method TO-15 minimum reporting limits of 1.0 ug/m^3 for all compounds except TCE and PCE which will have minimum reporting limits of 0.25 ug/m^3. The compound list (including method detection limits) is included in Attachment B. Laboratory analysis will include Category B deliverables.

While conducting sub-slab soil vapor sampling, the following will be performed:

- Measure PID readings before and after sampling

- At the time the flow valve is opened, document the initial reading and a reading shortly thereafter to verify that the canister and flow valve are filling properly
- Confirm sample was collected at an appropriate rate by monitoring gage pressure accordingly
- A minimum of three implant volumes shall be purged from each sampling point prior to collecting soil gas samples (less than 200 ml/minute
- Sample at a rate less than 200ml/minute for at least 20 minutes
- Field notes will include any observations during installation and purging of sub-slab points (e.g., quicker flow rate, final vacuum, etc.)
- The PID measurement, regulator ID, and SUMMA® ID will be included on the Chain of Custody Record
- Field duplicate pair will be collected by connecting a second canister before purging by installing a ¼ inch stainless steel "tee" fitting between the probe discharge tubing and the stainless steel valve.

Sub-slab soil samples, if collected, will be obtained by using a 1.5-inch drilling bit to penetrate the slab. Soil will be collected by driving a rigid tube (e.g. one-inch ID PVC riser or appropriate equivalent) into the underlying soils to a depth of approximately six inches. The tube will be retrieved and the soil extruded into a stainless steel bowl. A soil sample, excluding gravel, will be transferred to 40-ml vials. Groundwater grab samples will be collected by driving a small-diameter PVC wellpoint with 0.010-inch slots into saturated soils and collecting water into flexible tubing using a check valve. The water will be transferred from the tube into 40-ml sampling vials. Each soil and water sample will be analyzed for TCL VOCs by Mitkem via EPA Method 8260.

3.4 TASK 4 - MITIGATION SYSTEM EVALUATION

Based on the preliminary analytical results, MACTEC will perform an initial evaluation to determine the appropriate remedial alternative to limit soil vapors from the Site. MACTEC will provide validated data to NYSDEC and recommend a course of action for remediation, if necessary. As stated in the WA, MACTEC will conduct the appropriate activities discussed below:

- If the analytical results indicate that soil vapors are determined to be limited to the Site, MACTEC shall design an active sub-slab depressurization system in accordance with Radon Mitigation Standards (EPA 402-R-93-078, Revised April 1994) and SVI guidance. Emission from the system shall be evaluated in accordance with Division of Air Resources Air Guide 1 Model. MACTEC shall prepare the bidding package for system installation.

- If the analytical results indicate that soil vapors have impacted adjacent structures, MACTEC shall perform a short-duration Soil Vapor Extraction System (SVE) pilot scale test to evaluate the radius of influence and provide design recommendations pertaining to the number and spacing of extraction wells, the depth of screen(s), the size of blower(s), the operating vacuum, and anticipated contaminant removal rates. MACTEC will also evaluate the depth to groundwater and the potential groundwater fluctuation rates which may impact performance of the SVE. The pilot test shall consist of a 4-inch diameter extraction well equipped with a minimum 1.5 horsepower blower and approximately three 4-inch diameter monitoring points shall be installed to evaluate the radius of influence during the pilot scale test. The blower shall be operated at three different rates, identified as high (maximum), medium (80%), and low (50%), until steady state is obtained at the monitoring points. Vacuum pressure readings shall be obtained from the monitoring points, soil vapor points, and select sub-slab vapor points at documented intervals until steady state is reached, which shall be defined as consecutive readings of +/-20%. During the pilot scale test MACTEC will document measurements including: vacuum at extraction well and blower, air temperature at the blower inlet and outlet, air flow rate, VOC measurements during each measurement interval. MACTEC will collect VOC samples from the SVE exhaust for TO-15 analysis after each pilot test to provide data on VOC levels that may be observed during full scale operation of the system.

As stated in the PMWP, the project cost estimate is based on design of sub-slab depressurization systems as described in the first bullet above. MACTEC will provide an estimate for the cost of the pilot test and associated activities under separate cover prior to starting Task 4 to allow NYSDEC to consider costs during evaluation of appropriate remediation alternatives.

3.5 TASK 5 - INVESTIGATIVE DERIVED WASTE

MACTEC will containerize all soil cuttings and purge water in DOT-approved 55-gallon drums. At the end of a field mobilization, MACTEC will characterize the contents of each drum for disposal and coordinate the removal, transport, and appropriate disposal of all waste. Samples of containerized soil and water will be analyzed for waste characteristics to identify the proper disposal facility. While on-Site, the drummed waste will be maintained with sealed lids, marked with the appropriate labeling, and secured to a fixed Site feature such as a fence.

3.6 TASK 6 – VAPOR INVESTIGATION REPORT

Upon completion of the Task 2 and 3 field programs and receipt of analytical data, MACTEC will prepare a VI Report. The VI Report will document the field activities completed, provide results of the laboratory analysis, and provide proposed mitigations recommendations for review and

comment by NYSDEC and NYSDOH. Copies of log book pages, sampling forms, field data records, field instrument calibration records, photos of sampling locations, sampling data, and a Data Usability Summary Report (DUSR) will be included as appendices to the Data Summary Report. The DUSR will be prepared by a qualified, independent third party validation subcontractor.

Analytical results will be compared to the appropriate published health standard or guidelines, as indicated below. Reported concentrations of individual analytes observed in excess of the standards or guidelines will be noted in the report. Groundwater analytical results will be compared to the New York State Class GA Groundwater Quality Standards 6 New York Codes, Rules, and Regulations Parts 700-705 (NYS, 1999b). The indoor air and sub-slab soil vapor results will be compared to the NYSDOH guidelines for organic compounds (NYSDOH, 2005).

Three copies of the Draft VI Report will be sent to the NYSDEC Project Manager for distribution to NYSDOH, as appropriate and for comment. Upon receipt of comments, MACTEC will revise the draft report and print the requested number of final copies that NYSDEC indicates in the comment letter. One copy of the final report (including all text, photos, tables, figures, etc.) will be submitted as a single pdf file, which is "bookmarked". Electronic copies will be submitted on a compact disc. The Final report will incorporate the NYSDEC and NYSDOH review comments. The NYSDEC will be responsible for forwarding copies of the report to other state and county agencies, other than the NYSDOH. An Electronic Data Deliverable will also be provided as specified in the WA.

4.0 REFERENCES

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

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

New York State (NYS), 1999b. New York Codes, Rules, and Regulations, Title 6, Part 700-705 Water Quality Regulations Surface Water and Groundwater Classifications and Standards. Amended August 1999.

New York State Department of Environmental Conservation (NYSDEC), 2007. Work Assignment #D003826-27, Eugene's Dry Cleaners, Site # 1-52-157 - letter dated March 28, 2007.

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

New York State Department of Health (NYSDOH), 2006. "*Guidance for Evaluating Soil Vapor Intrusion in the State of New York"*, Final, October 2006.

FIGURES

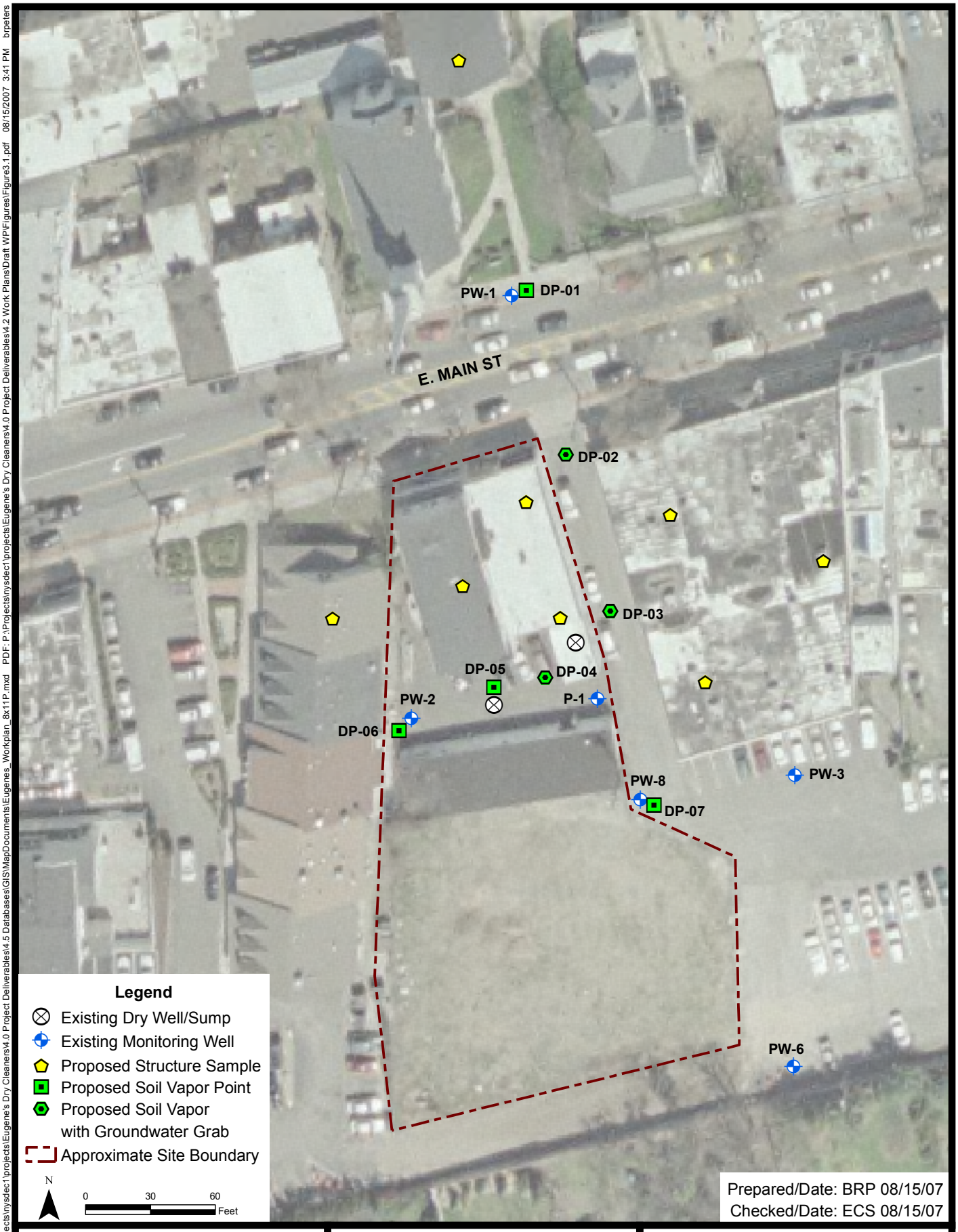
Prepared/Date: BRP 08/15/07
Checked/Date: ECS 08/15/07

NYSDEC
Eugene's Dry Cleaners
Babylon, NY

MACTEC

Site Location

Project 3612072087 Figure 1.1



Prepared/Date: BRP 08/15/07
Checked/Date: ECS 08/15/07

NYSDEC
Eugene's Dry Cleaners
Babylon, NY

MACTEC

Proposed Sample Locations

Project 3612072087 Figure 3.1

TABLES

TABLE 3.1: PROPOSED FIELD TASKS AND METHODOLOGY

Exploration Type	Exploration ID	Location	Termination Criteria	Sample Determination	Rationale	Analytical[1]
Geoprobe® Soil Borings	DP-01 to DP-07	DP-01 on north side of E Main St; DP-02 and DP-03 along E side of former Eugene's Cleaners; DP-04 and DP-05 to S of Site bldg; DP-06 near well PW-2; DP-7 near well PW-8 (see Figure 3.1).	Each advanced to approximately 15 feet below grade or 4 feet into water table if shallower.	Collect soil samples continuously for lithology and PID screening. Submit soil samples based on PID screening or from default depth of 1 to 2 ft bgs if no contamination is observed.	To characterize soil lithology and contaminant levels in vadose zone soils at locations where soil vapor points and/or groundwater grab samples are proposed.	TCL VOCs by EPA 8260.
Soil Vapor Points (installed by Geoprobe)	DP-01 to DP-07	Locations described above.	Vapor Implants set approximately two feet above the water table	One vapor sample from each new point.	To define extent of contamination from the site and evaluate the soil vapor extraction system performance.	VOCs by TO-15
Existing Monitoring Wells	PW-1; PW-2; PW-3; PW-6; PW-8; P-1	Groundwater samples taken from existing monitoring wells and piezometers located on and around site.	N/A	Sample to be purged a minimum of three well volumes and turbidity below 50 NTUs.	To define extent of contamination from the site.	TCL VOCs by EPA 8260.
Geoprobe® Well Points	DP-02 to DP-05	Groundwater grab samples from temporary well points installed at four of the geoprobe soil vapor locations.	Approximately 5 feet into water table	Grab samples	To define extent of contamination from the site.	TCL VOCs by EPA 8260.
Sub-Slab Vapor	SS-M01A/B; SS-M02; SS-M03; SS-M04; SS-M05A/B/C	Sub-slab soil vapor samples from one or more locations within former dry cleaners and three surrounding businesses	Samples collected for a minimum of 8 hours and a maximum of 24 hours	Samples as designated pending property access and suitable interior conditions	To characterize sub-slab levels of Site contaminants of concern.	VOCs by TO-15
Indoor and Ambient Air	SS-M01A/B; SS-M02; SS-M03; SS-M04; SS-M05A/B/C AA-001 and AA-002	Basement air co-located with sub-slab vapor samples. First floor air samples from each structure plus one second floor air sample from Site structure. Two ambient air from locations to be determined.	Samples collected for a minimum of 8 hours and a maximum of 24 hours	Samples as designated pending property access and suitable interior conditions	To characterize indoor air conditions.	VOCs by TO-15
Sub-slab and Sump Soil/Groundwater Grab Samples	SS-M01A/B; SS-M02; SUMP-1 and SUMP-2	At the sub-slab locations in the basement of former dry cleaners and in the adjacent basement of retail shop. Also soil and groundwater grab from basement sump in site structure	Target depths of six inches within water table and six inches below slab or soil surface	No groundwater samples if saturated soils are not encountered within one foot below slab	To characterize residual levels of contamination in soil and groundwater beneath Site structure	TCL VOCs by EPA 8260

Prepared/Date: MJW 4/26/07
Revised Date: ECS 8/23/07

NOTES:
VOC (Air) Volatile Organic Compounds by TO-15
VOC (Groundwater) Volatile Organic Compounds by 8260

Created by ECS 08/14/07
Checked by JWP 08/14/07

Table 3.2: Proposed Sample Identification and Analyses

				QA/QC Samples				Water Samples	Soil Samples		Vapor Samples	IDW Samples
Site Type	**Media**	**Location ID**	**Sample ID**	**MS/MSD**	**DUP**	**TRIP BLANK**	**RINS**	**VOCs (8260)**	**VOCs (8260)**	**Percent Moisture**	**VOCs (TO-15)**	**TCLP plus HAZ Char**
Existing Monitoring Well Sampling												
Well	Water	PW-1	ECPW1			1		1				
Well	Water	PW-2	ECPW2	2				1				
Well	Water	PW-3	ECPW3					1				
Well	Water	PW-6	ECPW6					1				
Well	Water	PW-8	ECPW8					1				
Well	Water	P-1	ECP01					1				
Geoprobe Soil Sampling (see Figure 3.1 for location information)												
Boring	Soil	DP-01	ECGS01xx						1	1		
Boring	Soil	DP-02	ECGS02xx						1	1		
Boring	Soil	DP-03	ECGS03xx						1	1		
Boring	Soil	DP-04	ECGS04xx						1	1		
Boring	Soil	DP-05	ECGS05xx	2	1				1	1		
Boring	Soil	DP-06	ECGS06xx						1	1		
Boring	Soil	DP-07	ECGS07xx						1	1		
Geoprobe Soil Vapor Sampling (see Figure 3.1 for location information)												
Boring	Vapor	DP-01	ECSV01								1	
Boring	Vapor	DP-02	ECSV02								1	
Boring	Vapor	DP-03	ECSV03								1	
Boring	Vapor	DP-04	ECSV04		1						1	
Boring	Vapor	DP-05	ECSV05								1	
Boring	Vapor	DP-06	ECSV06								1	
Boring	Vapor	DP-07	ECSV07								1	
Geoprobe Groundwater Sampling (see Figure 3.1 for location information)												
Boring	Water	DP-02	ECGW02					1				
Boring	Water	DP-03	ECGW03					1				
Boring	Water	DP-04	ECGW04		1			1				
Boring	Water	DP-05	ECGW05				1	1				
Sub-Slab Sampling (Location notes: M01A/B Dry Cleaners; M02 Surf Shop; M03 Bldg to West; M04 Church Hall M05A/B/C Bldg to East)												
Soil Vapor	Vapor	SS-M01A	ECSSM01A								1	
Soil Vapor	Soil	SS-M01A	ECSSM01A						1	1		
Soil Vapor	Water	SS-M01A	ECSSM01A					1				
Soil Vapor	Vapor	SS-M01B	ECSSM01B		1						1	
Soil Vapor	Soil	SS-M01B	ECSSM01B						1	1		
Soil Vapor	Water	SS-M01B	ECSSM01B					1				
Soil Vapor	Vapor	SS-M02	ECSSM02								1	
Soil Vapor	Soil	SS-M02	ECSSM02						1	1		
Soil Vapor	Water	SS-M02	ECSSM02					1				
Soil Vapor	Vapor	SS-M03	ECSSM03								1	
Soil Vapor	Vapor	SS-M04	ECSSM04								1	
Soil Vapor	Vapor	SS-M05A	ECSSM05A								1	
Soil Vapor	Vapor	SS-M05B	ECSSM05B								1	
Soil Vapor	Vapor	SS-M05C	ECSSM05C								1	

Created:ECS 08/14/07
Checked: JWP 08/14/07
Revised: ECS 08/23/07

Table 3.2: Proposed Sample Identification and Analyses

				QA/QC Samples				Water Samples	Soil Samples		Vapor Samples	IDW Samples
Site Type	**Media**	**Location ID**	**Sample ID**	**MS/MSD**	**DUP**	**TRIP BLANK**	**RINS**	**VOCs (8260)**	**VOCs (8260)**	**Percent Moisture**	**VOCs (TO-15)**	**TCLP plus HAZ Char**
Sump Sampling												
Sump	Water	SUMP1	ECCDM01					1				
Sump	Soil	SUMP1	ECCLM01						1	1		
Basement Air Sampling												
Air	Vapor	SS-M01A	ECSS01A								1	
Air	Vapor	SS-M01B	ECSS01B								1	
Air	Vapor	SS-M02	ECSS02								1	
Air	Vapor	SS-M03	ECSS03								1	
Air	Vapor	SS-M04	ECSS04								1	
Air	Vapor	SS-M05A	ECSS05A								1	
Air	Vapor	SS-M05B	ECSS05B								1	
Air	Vapor	SS-M05C	ECSS05C								1	
First Floor Air Sampling												
Air	Vapor	SS-M01A	ECFA01A								1	
Air	Vapor	SS-M01B	ECFA01B								1	
Air	Vapor	SS-M02	ECFA02								1	
Air	Vapor	SS-M03	ECFA03								1	
Air	Vapor	SS-M04	ECFA04								1	
Air	Vapor	SS-M05	ECFA05								1	
Second Floor Air Sampling												
Air	Vapor	SS-M01	ECSA01								1	
Ambient Air Sampling												
Air	Vapor	AA-001	ECAA01								1	
Air	Vapor	AA-002	ECAA02								1	
Investigation Derived Waste												
Drum	Soil	TBD	ECDS01									1
Drum	Water	TBD	ECDS02									1
TOTAL SAMPLES				4	4	1	1	14	11	11	32	2

Notes:
Sample ID = EC (Eugene's Dry Cleaners); MW (monitoring well); SV (soil vapor); GW (geoprobe water); GS (geoprobe soil)
SS (sub-slab); BA (basement air); FA (First livable floor air); AA (ambient air); CD (sump sediment); CL (sump liquid)
MS/MSD = matrix spike and matrix spike duplicate sample collected
DUP = Duplicate sample collected
RINS = rinseate sample collected
VOCs water and soil = Target Compound List Volatile Organic Compounds analyzed by EPA 8260
TO-15 = Vapor samples analyzed for VOCs by USEPA Method TO-15.
IDW = Investigation Derived Waste (IDW) analyzed for VOCs and metals by Toxic Characteristic Leaching Procedure (TCLP) plus hazardous waste characteristics

Created:ECS 08/14/07
Checked: JWP 08/14/07
Revised: ECS 08/23/07

APPENDIX A

NYSDOH GUIDANCE FOR EVALUATING SOIL VAPOR INTRUSION
(Sections 2.6 and 2.7 from Final, October 2006 guidance document)

FINAL

Guidance for Evaluating Soil Vapor Intrusion in the State of New York

October 2006

Prepared by:

NEW YORK STATE DEPARTMENT OF HEALTH
Center for Environmental Health
Bureau of Environmental Exposure Investigation

2.6 Sampling locations

The general approach for selecting sampling locations as part of a soil vapor intrusion investigation is similar to the approach for the investigation of other environmental media (e.g., soil and groundwater). Sampling locations should be selected with consideration of the conceptual site model [Section 1.6]. These locations should be selected to meet the stated objectives of the sampling program. Additionally, similar to the investigation of soil and groundwater, it is typical to start at a known or suspected source and work outward. The specific approach, however, will be dependent upon site-specific and building-specific conditions.

2.6.1 Soil vapor

If available, existing environmental data (e.g., groundwater and soil data) and site background information should be used to select locations for sampling soil vapor as part of a vapor intrusion investigation. Locations will vary depending upon surface features (e.g., presence or absence of buildings, areas of pavement, or vacant lot) and subsurface characteristics (e.g., soil stratigraphy, buried structures, utility corridors, or clay lenses), as well as the specific purpose of the sampling. Therefore, a figure illustrating proposed sampling locations (with respect to both areal position and depth), actual locations sampled in the field, and relevant on-site and off-site features should be included in all sampling work plans and reports.

Examples of how locations may vary given the specific purpose of the sampling follow. They include general guidelines that should be followed when selecting soil vapor sampling locations:

a. to evaluate the **potential for current on-site or off-site exposures**, samples should be collected
    1. in the vicinity of a building's foundation [see special sampling consideration at the end of Section 2.6.1 if sampling around a building with no surrounding surface confining layer], as well as between the building's foundation and the source (if known and not located beneath the building),
    2. along the site's perimeter, and
    3. at a depth comparable to the depth of foundation footings (determined on a building-specific or site-specific basis) or at least 1 foot above the water table in areas where the groundwater table is less than 6 feet below grade;
b. to evaluate the **potential for future exposures if development** on a known or suspected contaminated area on-site or off-site is possible, representative samples should be collected
    1. in areas with either known or suspected subsurface sources of volatile chemicals, in areas where elevated readings were obtained with field equipment during previous environmental investigations, and in areas of varying concentrations of contamination in the upper groundwater,
    2. in a grid pattern across the area (at an appropriate spacing interval for the size of the area) if information is limited for the area, and
    3. at multiple depths from the suspected subsurface source, or former source, to a depth comparable to the expected depth of foundation footings;

c. to evaluate the **potential for off-site soil vapor contamination**, samples should be collected

   1. along the site's perimeter,
   2. in areas of potential subsurface sources of vapor contamination (e.g., a groundwater plume that has migrated off-site), and
   3. at a depth comparable to the depth of foundation footings (determined on a site-specific basis) or at least 1 foot above the water table in areas where the groundwater table is less than 6 feet below grade;

d. to evaluate on-site and off-site **preferential migration pathways** in areas with low permeability soils, samples should be collected

   1. along preferential soil vapor flow paths, such as sewer lines, utility corridors, trenches, pipelines, and other subsurface structures that are likely to be bedded with higher permeability materials, and
   2. at depths corresponding to these subsurface features (will depend on site-specific conditions);

e. to characterize on-site or off-site **contamination in the vadose zone**, samples should be collected

   1. in areas with either known or suspected sources of volatile chemicals, in areas where elevated readings were obtained with field equipment (e.g., PID) during previous soil and groundwater investigations, and in areas of varying concentrations of contamination in the upper groundwater regime, and
   2. at appropriate depths associated with these areas (will depend on site-specific conditions); and

f. to investigate the **influence of contaminated groundwater or soil on soil vapor** and to characterize the **vertical profile** of contamination, samples should be collected from clusters of soil vapor probes at varying depths in the vadose zone [Figure 2.2, Section 2.7.1] and preferably in conjunction with the collection of groundwater or soil samples.

Soil vapor samples collected at depths shallower than 5 feet below grade may be prone to negative bias due to infiltration of outdoor air. Therefore, samples from these depths should be collected only if appropriate (based on site-specific conditions), and sampling procedures and results should be reviewed accordingly. The depth of sampling near buildings with slab-on-grade foundations is dependent upon site-specific conditions (e.g., building surrounded by grassy or surface confining layer).

When collecting soil vapor samples around a building with no surrounding surface confining layer (e.g., pavement or sidewalk), samples should be located in native or undisturbed soils away from fill material surrounding the building (approximately 10 feet away from the building) to avoid sampling in an area that may be influenced by the building's operations. For example, operation of HVAC systems, fireplaces, or mechanical equipment (e.g., clothes dryers or exhaust fans/vents) in a building may exacerbate the infiltration of outdoor air into the vadose zone adjacent to the building. As a result, soil vapor samples collected in uncovered areas adjacent to the building may not be representative.

Investigations of soil vapor contamination should proceed outward from known or suspected subsurface sources, as appropriate, on an areal basis until the nature and extent of

subsurface vapor contamination has been characterized and human exposures have been addressed.

2.6.2 Sub-slab vapor

Existing environmental data (e.g., soil vapor, groundwater and soil data), site background information, and building construction details (e.g., basement, slab-on-grade, or multiple types of foundations, HVAC systems, etc.) should be considered when selecting buildings and locations within buildings for sub-slab vapor sampling.

At a minimum, these general guidelines should be followed when selecting buildings to sample for sub-slab vapors:

a. buildings, including residential dwellings, located above or directly adjacent to known or suspected areas of subsurface volatile chemical contamination should be sampled;

b. buildings in which screening with field equipment (e.g., PID, ppbRAE, Jerome Mercury Vapor Analyzer, etc.) suggests a completed migration pathway, such as when readings are above background and from unidentified sources or when readings show increasing gradients, should be sampled; and

c. buildings within known or suspected areas of subsurface volatile chemical contamination that are used or occupied by sensitive population groups (e.g., daycare facilities, schools, nursing homes, etc.) should be given special consideration for sampling.

Investigations of sub-slab vapor and/or indoor air contamination should proceed outward from known or suspected sources, as appropriate, on an areal basis until the nature and extent of subsurface vapor contamination has been characterized and potential and current human exposures have been addressed. In cases of widespread vapor contamination and depending upon the basis for making decisions (e.g., a "blanket mitigation" approach within a specified area of documented vapor contamination [Section 3.3.1]), a representative number of buildings from an identified study area, rather than each building, may be sampled. Prior to implementation, this type of sampling approach should be approved by State agency personnel.

Within a building, sub-slab vapor samples should be collected

a. in at least one central location away from foundation footings, and

b. from the soil or aggregate immediately below the basement slab or slab-on-grade.

The number of sub-slab vapor samples that should be collected in a building depends upon the number of slabs (e.g., multiple slabs-on-grade in a large warehouse) and foundation types (e.g., combined basement and slab-on-grade in a residence). At least one sub-slab vapor sample should be collected from each representative area.

2.6.3 Indoor air

Existing environmental data (e.g., soil vapor, groundwater and soil data), site background information, and building construction details (e.g., basement, slab-on-grade, or multiple types of foundations; number and operation of HVAC systems; elevator shafts; tunnels or other confined-space entry points; etc.) should be considered when selecting buildings and

locations within buildings for indoor air sampling. Indoor air samples are typically collected concurrently with sub-slab vapor and outdoor air samples [Section 2.2.4].

At a minimum, these general guidelines should be followed when selecting buildings to sample for indoor air:

a. where sub-slab vapor samples were collected without indoor air samples, buildings in which elevated concentrations of contaminants were measured in sub-slab vapor samples should be sampled;

b. buildings, including residential dwellings, located above or directly adjacent to known or suspected subsurface sources of volatile chemicals or known soil vapor contamination should be sampled;

c. buildings in which screening with field equipment (e.g., PID, ppbRAE, Jerome Mercury Vapor Analyzer, etc.) suggests a completed migration pathway, such as when readings are above background and from unidentified sources or when readings show increasing gradients, should be sampled; and

d. buildings within known or suspected areas of subsurface volatile chemical contamination that are used or occupied by sensitive population groups (e.g., daycare facilities, schools, nursing homes, etc.) should be given special consideration for sampling.

To characterize contaminant concentration trends and potential exposures, indoor air samples should be collected

a. from the crawl space area,

b. from the basement (where vapor infiltration is suspected, such as near sump pumps or indoor wells, or in a central location) at a height approximately three feet above the floor to represent a height at which occupants normally are seated and/or sleep,

c. from the lowest level living space (in centrally-located, high activity use areas) at a height approximately three feet above the floor to represent a height at which occupants normally are seated and/or sleep, and

d. if in a commercial setting (e.g., a strip mall), from multiple tenant spaces at a height approximately three feet above the floor to represent a height at which occupants normally are seated.

These locations are illustrated in Figure 2.1.

Investigations of indoor air contamination should proceed outward from known or suspected subsurface sources, as appropriate, on an areal basis until potential and current human exposures associated with soil vapor intrusion have been addressed. In cases of widespread vapor contamination and depending upon the basis for making decisions (e.g., a "blanket mitigation" approach within a specified area of documented vapor contamination), a representative number of buildings from an identified study area, rather than each building, may be sampled. Prior to implementation, this type of sampling approach should be approved by State agency personnel.

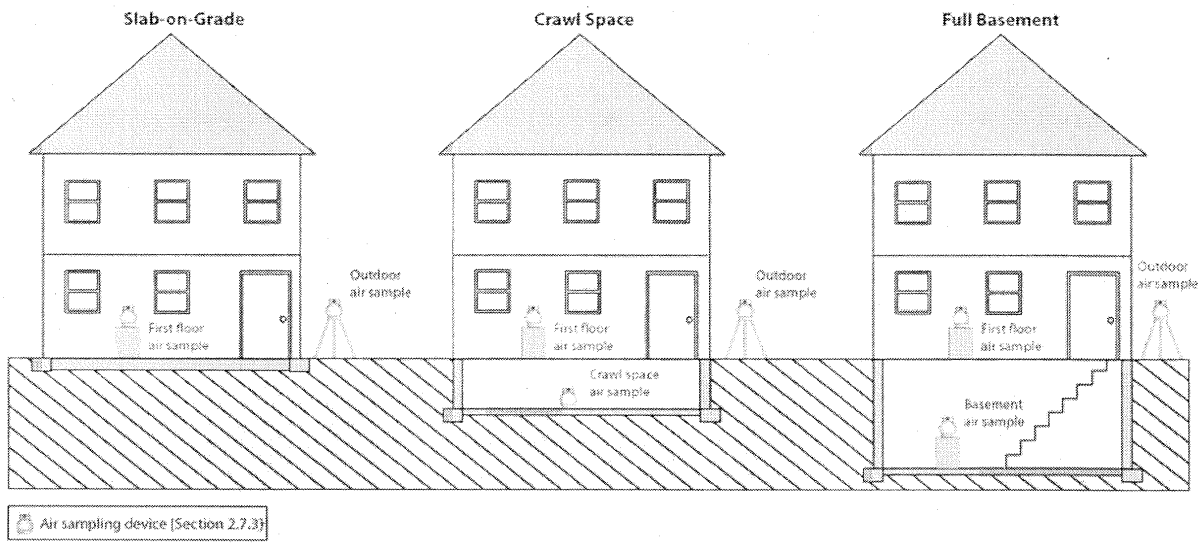


Figure 2.1
Schematic of indoor and outdoor air sampling locations

2.6.4 Outdoor air

Typically, an outdoor air sample is collected outside of each building where an indoor air sample is collected. However, if several buildings are being sampled within a localized area, representative outdoor air samples may be appropriate. For example, one outdoor air sample may be sufficient for three houses being sampled in a cul-de-sac. Outdoor air samples should be collected from a representative upwind location, away from wind obstructions (e.g., trees or bushes), and at a height above the ground to represent breathing zones (3 to 5 feet) [Figure 2.1]. A representative sample is one that is not biased toward obvious sources of volatile chemicals (e.g., automobiles, lawn mowers, oil storage tanks, gasoline stations, industrial facilities, etc.). For buildings with HVAC systems that draw outdoor air into the building, an outdoor air sample collected near the outdoor air intake may be appropriate.

2.7 Sampling protocols

The procedures recommended here may be modified depending on site-specific conditions, the sampling objectives, or emerging technologies and methodologies. Alternative sampling procedures should be described thoroughly and proposed in a work plan submitted for review by the State. The State will review and comment on the proposed procedure and consider the efficacy of the alternative sampling procedure based on the objectives of investigation. In all cases, work plans should thoroughly describe the proposed sampling procedure. Similarly, the procedures that were implemented in the field should be documented and included in the final report of the sampling results.

2.7.1 Soil vapor

Soil vapor probe installations [Figure 2.2] may be permanent, semi-permanent or temporary. In general, permanent or semi-permanent installations are preferred for data consistency reasons and to ensure outdoor air infiltration does not occur. Temporary probes should only be used if measures are taken to ensure that an adequate surface seal is created to prevent outdoor air infiltration and if tracer gas is used at every sampling location. [See Section 2.7.5 for additional information about the use of tracer gas when collecting soil vapor samples.] Soil vapor implants or probes should be constructed in the same manner at all sampling locations to minimize possible discrepancies. The following procedures should be included in any permanent construction protocol:

a. implants should be installed using an appropriate method based on site conditions (e.g., direct push, manually driven, auger — if necessary to attain the desired depth or if sidewall smearing is a concern, etc.);

b. porous, inert backfill material (e.g., glass beads, washed #1 crushed stone, etc.) should be used to create a sampling zone 1 to 2 feet in length;

c. implants should be fitted with inert tubing (e.g., polyethylene, stainless steel, nylon, Teflon®, etc.) of the appropriate size (typically 1/8 inch to 1/4 inch diameter) and of laboratory or food grade quality to the surface;

d. soil vapor probes should be sealed above the sampling zone with a bentonite slurry for a minimum distance of 3 feet to prevent outdoor air infiltration and the remainder of the borehole backfilled with clean material;

e. for multiple probe depths, the borehole should be grouted with bentonite between probes to create discrete sampling zones or separate nested probes should be installed [Figure 2.2]; and

f. steps should be taken to minimize infiltration of water or outdoor air and to prevent accidental damage (e.g., setting a protective casing around the top of the probe tubing and grouting in place to the top of bentonite, sloping the ground surface to direct water away from the borehole like a groundwater monitoring well, etc.).

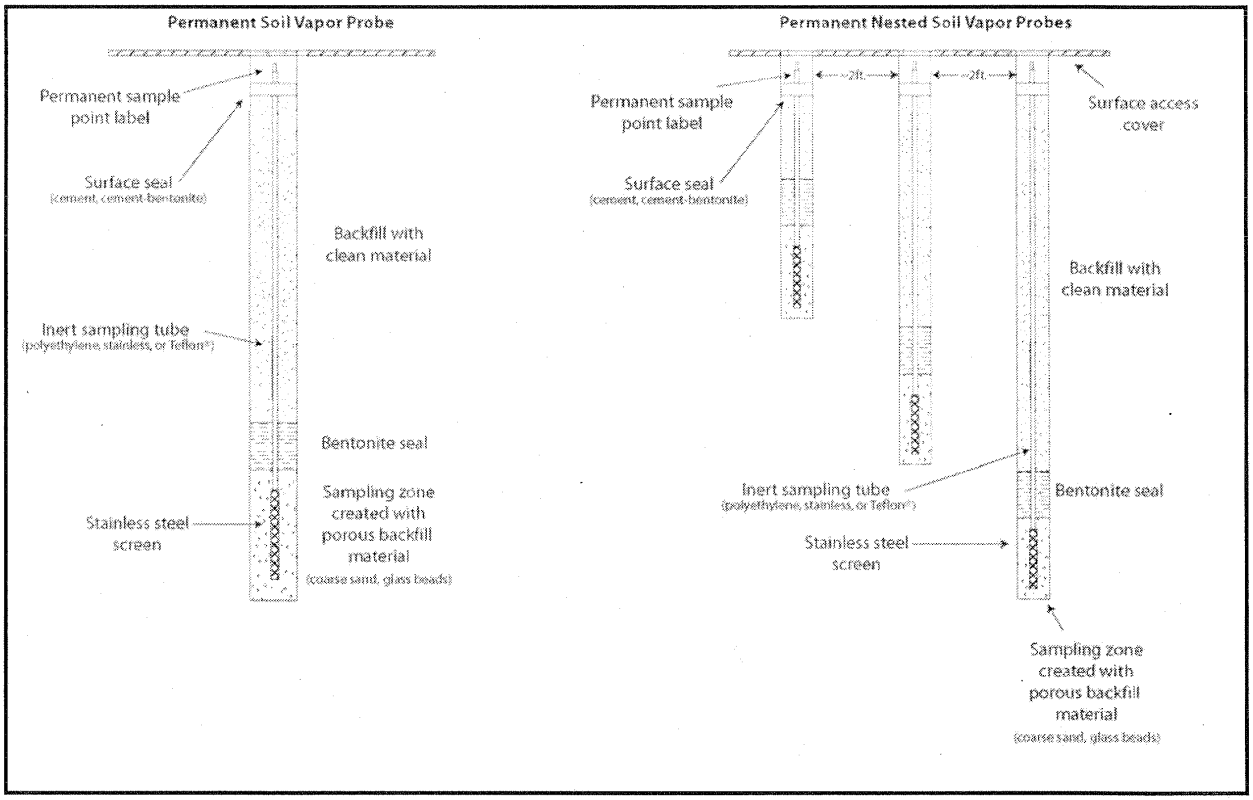


Figure 2.2

Schematics of a generic permanent soil vapor probe
and permanent nested soil vapor probes

[Note: Many variations exist and may be proposed in a work plan. Proposed installations should meet the sampling objectives and requirements of the analytical methods.]

To obtain representative samples and to minimize possible discrepancies, soil vapor samples should be collected in the following manner at all locations:

a. at least 24 hours after the installation of permanent probes and shortly after the installation of temporary probes, one to three implant volumes (i.e., the volume of the sample probe and tube) should be purged prior to collecting the samples;

b. flow rates for both purging and collecting should not exceed 0.2 liters per minute to minimize outdoor air infiltration during sampling;

c. samples should be collected, using conventional sampling methods, in an appropriate container — one which

   i. meets the objectives of the sampling (e.g., investigation of areas where low or high concentrations of volatile chemicals are expected; to minimize losses of volatile chemicals that are susceptible to photodegradation),

   ii. is consistent with the sampling and analytical methods (e.g., low flow rate; Summa® canisters if analyzing by using EPA Method TO-15), and

   iii. is certified clean by the laboratory;

d. sample size depends upon the volume of that will achieve minimum reporting limits [Section 2.9]; and

e. a tracer gas (e.g., helium, butane, sulfur hexafluoride, etc.) should be used when collecting soil vapor samples to verify that adequate sampling techniques are being implemented (i.e., to verify infiltration of outdoor air is not occurring) [Section 2.7.5].

In some cases, weather conditions may present certain limitations on soil vapor sampling. For example, condensation in the sample tubing may be encountered during winter sampling due to low outdoor air temperatures. Devices, such as tube warmers, may be used to address these conditions. Anticipated limitations to the sampling should be discussed prior to the sampling event so appropriate measures can be taken to address these difficulties and produce representative and reliable data.

When soil vapor samples are collected, the following actions should be taken to document local conditions during sampling that may influence interpretation of the results:

a. if sampling near a commercial or industrial building, uses of volatile chemicals during normal operations of the facility should be identified;

b. outdoor plot sketches should be drawn that include the site, area streets, neighboring commercial or industrial facilities (with estimated distance to the site), outdoor air sampling locations (if applicable), and compass orientation (north);

c. weather conditions (e.g., precipitation and outdoor temperature) should be noted for the past 24 to 48 hours; and

d. any pertinent observations should be recorded, such as odors and readings from field instrumentation.

Additional information that could be gathered to assist in the interpretation of the results includes barometric pressure, wind speed and wind direction.

The field sampling team should maintain a sample log sheet summarizing the following:

a. sample identification,

b. date and time of sample collection,

c. sampling depth,

d. identity of samplers,

e. sampling methods and devices,

f. purge volumes,

g. volume of soil vapor extracted,

h. if canisters used, the vacuum before and after samples were collected,

i. apparent moisture content (dry, moist, saturated, etc.) of the sampling zone, and

j. chain of custody protocols and records used to track samples from sampling point to analysis.

2.7.2 Sub-slab vapor

During colder months, heating systems should be operating to maintain normal indoor air temperatures (i.e., 65 – 75 °F) for at least 24 hours prior to and during the scheduled sampling time. Prior to installation of the sub-slab vapor probe, the building floor should be inspected and any penetrations (cracks, floor drains, utility perforations, sumps, etc.) should be noted and recorded. Probes should be installed at locations where the potential for ambient air infiltration via floor penetrations is minimal.

Sub-slab vapor probe installations [Figure 2.3] may be permanent, semi-permanent or temporary. A vacuum should not be used to remove drilling debris from the sampling port. Sub-slab implants or probes should be constructed in the same manner at all sampling locations to minimize possible discrepancies. The following procedures should be included in any construction protocol:

a. permanent recessed probes should be constructed with brass or stainless steel tubing and fittings;

b. temporary probes should be constructed with inert tubing (e.g., polyethylene, stainless steel, nylon, Teflon®, etc.) of the appropriate size (typically 1/8 inch to 1/4 inch diameter), and of laboratory or food grade quality;

c. tubing should not extend further than 2 inches into the sub-slab material;

d. porous, inert backfill material (e.g., glass beads, washed #1 crushed stone, etc.) should be added to cover about 1 inch of the probe tip for permanent installations; and

e. the implant should be sealed to the surface with non-VOC-containing and non-shrinking products for temporary installations (e.g., permagum grout, melted beeswax, putty, etc.) or cement for permanent installations.

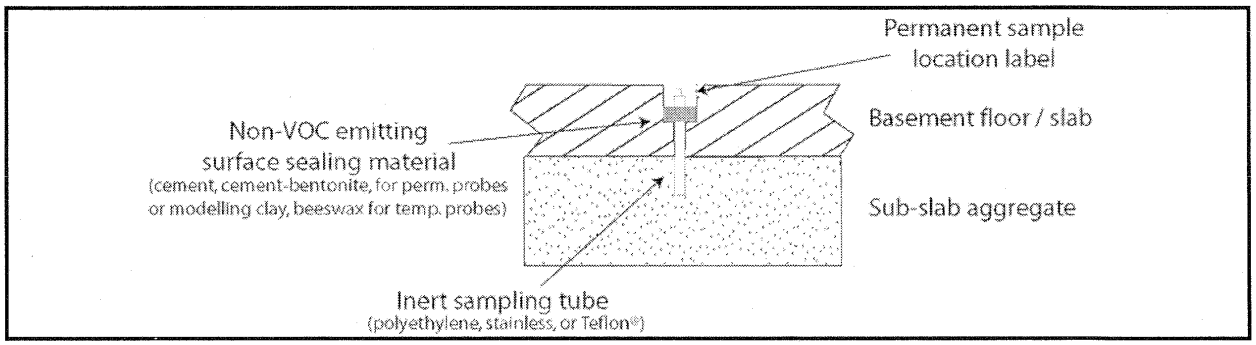


Figure 2.3

Schematic of a generic sub-slab vapor probe

[Note: Many variations exist and may be proposed in a work plan. Proposed installations should meet the sampling objectives and requirements of the analytical methods.]

To obtain representative samples that meet the data quality objectives, sub-slab vapor samples should be collected in the following manner:

a. after installation of the probes, one to three volumes (i.e., the volume of the sample probe and tube) must be purged prior to collecting the samples to ensure samples collected are representative;

b. flow rates for both purging and collecting must not exceed 0.2 liters per minute to minimize ambient air infiltration during sampling; and

c. samples should be collected, using conventional sampling methods, in an appropriate container — one which

    i. meets the objectives of the sampling (e.g., investigation of areas where low or high concentrations of volatile chemicals are expected; to minimize losses of volatile chemicals that are susceptible to photodegradation),

    ii. is consistent with the sampling and analytical methods (e.g., low flow rate; Summa® canisters if analyzing by using EPA Method TO-15), and

    iii. is certified clean by the laboratory;

d. sample size depends upon the volume of that will achieve minimum reporting limits [Section 2.9], the flow rate, and the sampling duration; and

e. ideally, samples should be collected over the same period of time as concurrent indoor and outdoor air samples.

When sub-slab vapor samples are collected, the following actions should be taken to document conditions during sampling and ultimately to aid in the interpretation of the sampling results [Section 3]:

a. historic and current storage and uses of volatile chemicals should be identified, especially if sampling within a commercial or industrial building (e.g., use of volatile chemicals in commercial or industrial processes and/or during building maintenance);

b. the use of heating or air conditioning systems during sampling should be noted;

c. floor plan sketches should be drawn that include the floor layout with sampling locations, chemical storage areas, garages, doorways, stairways, location of basement sumps or subsurface drains and utility perforations through building foundations, HVAC system air supply and return registers, compass orientation (north), footings that create separate foundation sections, and any other pertinent information should be completed;

d. outdoor plot sketches should be drawn that include the building site, area streets, outdoor air sampling locations (if applicable), compass orientation (north), and paved areas;

e. weather conditions (e.g., precipitation and indoor and outdoor temperature) and ventilation conditions (e.g., heating system active and windows closed) should be reported; and

f. any pertinent observations, such as spills, floor stains, smoke tube results, odors and readings from field instrumentation (e.g., vapors via PID, ppbRAE, Jerome Mercury Vapor Analyzer, etc.), should be recorded.

Additional documentation that could be gathered to assist in the interpretation of the results includes information about air flow patterns and pressure relationships obtained by using smoke tubes or other devices (especially between floor levels and between suspected

contaminant sources and other areas), the barometric pressure and photographs to accompany floor plan sketches.

The field sampling team should maintain a sample log sheet summarizing the following:

a. sample identification,
b. date and time of sample collection,
c. sampling depth,
d. identity of samplers,
e. sampling methods and devices,
f. soil vapor purge volumes,
g. volume of soil vapor extracted,
h. if canisters used, vacuum of canisters before and after samples collected,
i. apparent moisture content (dry, moist, saturated, etc.) of the sampling zone, and
j. chain of custody protocols and records used to track samples from sampling point to analysis.

2.7.3 Indoor air

[Reference: NYSDOH's *Indoor Air Sampling & Analysis Guidance (February 1, 2005)*]

During colder months, heating systems should be operating to maintain normal indoor air temperatures (i.e., 65 – 75 °F) for at least 24 hours prior to and during the scheduled sampling time. If possible, prior to collecting indoor samples, a pre-sampling inspection [Section 2.11.1] should be performed to evaluate the physical layout and conditions of the building being investigated, to identify conditions that may affect or interfere with the proposed sampling, and to prepare the building for sampling. This process is described in Section 2.11.1.

In general, indoor air samples should be collected in the following manner:

a. sampling duration should reflect the exposure scenario being evaluated without compromising the detection limit or sample collection flow rate (e.g., an 8 hour sample from a workplace with a single shift versus a 24 hour sample from a workplace with multiple shifts). To ensure that air is representative of the locations sampled and to avoid undue influence from sampling personnel, samples should be collected for at least 1 hour. If the goal of the sampling is to represent average concentrations over longer periods, then longer duration sampling periods may be appropriate. Typically, 24 hour samples are collected from residential settings;
b. personnel should avoid lingering in the immediate area of the sampling device while samples are being collected;
c. sample flow rates must conform to the specifications in the sample collection method and, if possible, should be consistent with the flow rates for concurrent outdoor air and sub-slab samples; and
d. samples must be collected, using conventional sampling methods, in an appropriate container — one which

i. meets the objectives of the sampling (e.g., investigation of areas where low or high concentrations of volatile chemicals are expected; to minimize losses of volatile chemicals that are susceptible to photodegradation),

ii. is consistent with the sampling and analytical methods (e.g., low flow rate; Summa® canisters if analyzing by using EPA Method TO-15), and

iii. is certified clean by the laboratory.

At sites with tetrachloroethene contamination, passive air monitors that are specifically analyzed for tetrachloroethene (i.e., "perc badges") are commonly used to collect indoor and outdoor air samples. If site characterization activities indicate that degradation products of tetrachloroethene also represent a vapor intrusion concern, perc badges may be used to indicate the likelihood of vapor intrusion (i.e., by using tetrachloroethene as a surrogate) followed, as appropriate, by more comprehensive sampling and laboratory analyses to quantify both tetrachloroethene and its degradation products. Perc badge samples ideally should be collected over a twenty-four hour period, but for no less than eight hours.

The following actions should be taken to document conditions during indoor air sampling and ultimately to aid in the interpretation of the sampling results [Section 3]:

a. historic and current uses and storage of volatile chemicals should be identified, especially if sampling within a commercial or industrial building (e.g., use of volatile chemicals in commercial or industrial processes and/or during building maintenance);

b. a product inventory survey documenting sources of volatile chemicals present in the building during the indoor air sampling that could potentially influence the sample results should be completed [Section 2.11.2];

c. the use of heating or air conditioning systems during sampling should be noted;

d. floor plan sketches should be drawn that include the floor layout with sampling locations, chemical storage areas, garages, doorways, stairways, location of basement sumps or subsurface drains and utility perforations through building foundations, HVAC system supply and return registers, compass orientation (north), footings that create separate foundation sections, and any other pertinent information should be completed;

e. outdoor plot sketches should be drawn that include the building site, area streets, outdoor air sampling locations (if applicable), compass orientation (north), and paved areas;

f. weather conditions (e.g., precipitation and indoor and outdoor temperature) and ventilation conditions (e.g., heating system active and windows closed) should be reported; and

g. any pertinent observations, such as spills, floor stains, smoke tube results, odors and readings from field instrumentation (e.g., vapors via PID, ppbRAE, Jerome Mercury Vapor Analyzer, etc.), should be recorded.

Additional documentation that could be gathered to assist in the interpretation of the results includes information about air flow patterns and pressure relationships obtained by using smoke tubes or other devices (especially between floor levels and between suspected contaminant sources and other areas), the barometric pressure and photographs to accompany floor plan sketches.

The field sampling team should maintain a sample log sheet summarizing the following:

a. sample identification,
b. date and time of sample collection,
c. sampling height,
d. identity of samplers,
e. sampling methods and devices,
f. depending upon the method, volume of air sampled,
g. if canisters are used, vacuum of canisters before and after samples collected, and
h. chain of custody protocols and records used to track samples from sampling point to analysis.

2.7.4 Outdoor air

Outdoor air samples should be collected simultaneously with indoor air samples to evaluate the potential influence, if any, of outdoor air on indoor air quality. They may also be collected simultaneously with soil vapor samples to identify potential outdoor air interferences associated with infiltration of outdoor air into the sampling apparatus while the soil vapor was collected. To obtain representative samples that meet the data quality objectives, outdoor air samples should be collected in a manner consistent with that for indoor air samples (described in Section 2.7.3).

The following actions should be taken to document conditions during outdoor air sampling and ultimately to aid in the interpretation of the sampling results [Section 3]:

a. outdoor plot sketches should be drawn that include the building site, area streets, outdoor air sampling locations, the location of potential interferences (e.g., gasoline stations, factories, lawn movers, etc.), compass orientation (north), and paved areas;
b. weather conditions (e.g., precipitation and outdoor temperature) should be reported; and
c. any pertinent observations, such as odors, readings from field instrumentation, and significant activities in the vicinity (e.g., operation of heavy equipment or dry cleaners) should be recorded.

2.7.5 Tracer gas

When collecting soil vapor samples as part of a vapor intrusion evaluation, a tracer gas serves as a quality assurance/quality control measure to verify the integrity of the soil vapor probe seal. Without the use of a tracer, there is no way to verify that a soil vapor sample has not been diluted by outdoor air.

Depending on the nature of the contaminants of concern, a number of different compounds can be used as a tracer. Typically, sulfur hexafluoride (SF_6) or helium are used as tracers because they are readily available, have low toxicity, and can be monitored with portable measurement devices. Butane and propane (or other gases) could also be used as a tracer in some situations. Compounds other than those mentioned here may be appropriate, provided they meet project-specific data quality objectives. Where applicable, steps should

be taken to ensure that the gas used by the laboratory to clean the air sampling container is different from the gas used as a tracer during sampling (e.g., helium).

The protocol for using a tracer gas is straightforward: simply enrich the atmosphere in the immediate vicinity of the area where the probe intersects the ground surface with the tracer gas, and measure a vapor sample from the probe for the presence of high concentrations (> 10%) of the tracer. A cardboard box, a plastic pail, or even a garbage bag can serve to keep the tracer gas in contact with the probe during the testing. If there are concerns about infiltration of ambient air through other parts of the sampling train (such as around the fittings, not just at the probe/ground interface), then consideration should be given to ensuring that the tracer gas is in contact with the entire sampling apparatus. In these cases, field personnel may prefer to use a liquid tracer — soaking paper towels with a liquid tracer and placing the towels around the probe/ground interface, around fittings, and/or in the corner of a shroud.

There are two basic approaches to testing for the tracer gas:

1. include the tracer gas in the list of target analytes reported by the laboratory; or
2. use a portable monitoring device to analyze a sample of soil vapor for the tracer prior to and after sampling for the compounds of concern. (Note that the tracer gas samples can be collected via syringe, Tedlar® bag etc. They need not be collected in Summa® canisters or minicans.)

The advantage of the second approach is that the real time tracer sampling results can be used to confirm the integrity of the probe seals prior to formal sample collection.

Figure 2.4 depicts common methods for using tracer gas. In examples a, b and c, the tracer gas is released in the enclosure prior to initially purging the sample point. Care should be taken to avoid excessive purging prior to sample collection. Care should also be taken to prevent pressure build-up in the enclosure during introduction of the tracer gas. Inspection of the installed sample probe, specifically noting the integrity of the surface seal and the porosity of the soil in which the probe is installed, will help to determine the tracer gas setup. Figure 2.4a may be most effective at preventing tracer gas infiltration, however, it may not be appropriate in some situations depending on site-specific conditions. Figures 2.4b and 2.4c may be sufficient for probes installed in tight soils with well-constructed surface seals. Figure 2d provides an example of using a liquid tracer. In all cases, the same tracer gas application should be used for all probes at any given site.

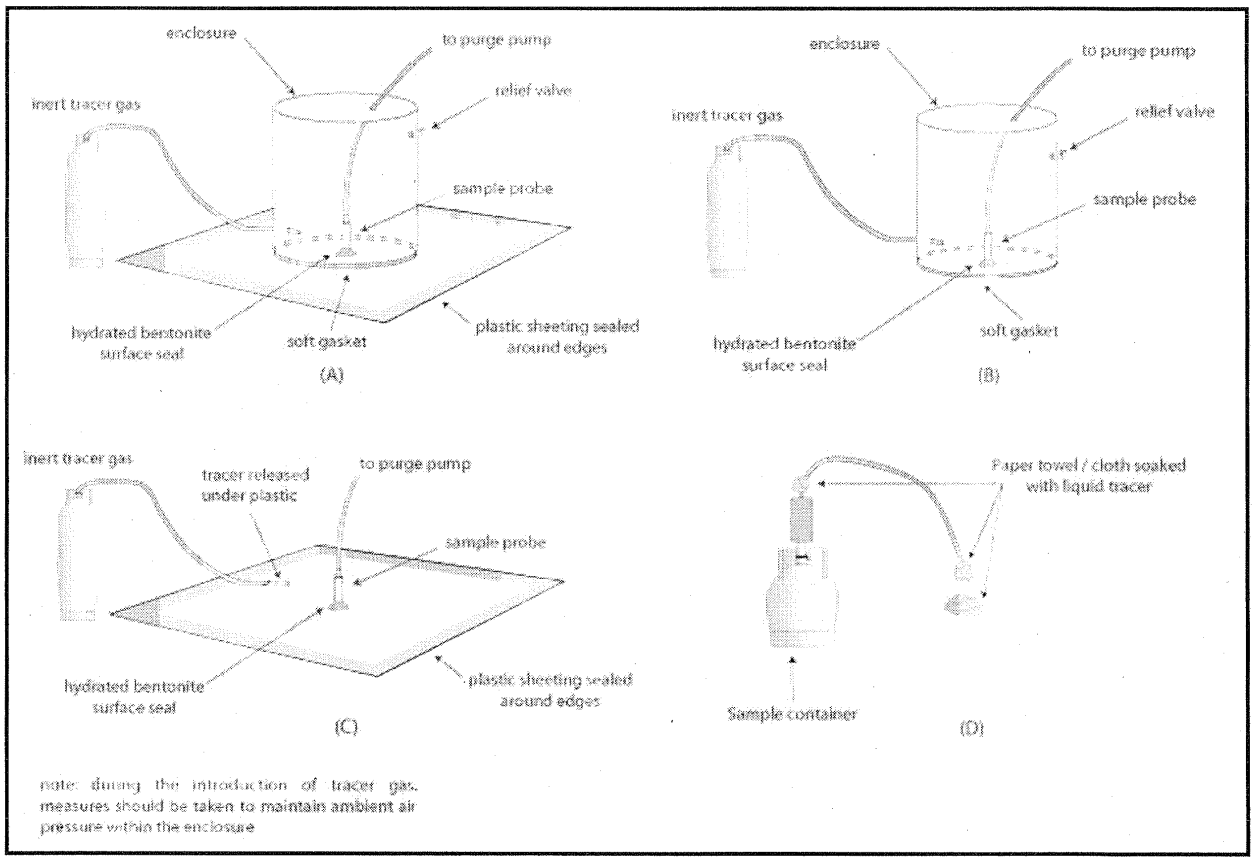


Figure 2.4
Schematics of generic tracer gas applications when collecting soil vapor samples

Because minor leakage around the probe seal should not materially affect the usability of the soil vapor sampling results, the mere presence of the tracer gas in the sample should not be a cause for alarm. Consequently, portable field monitoring devices with detection limits in the low ppm range are more than adequate for screening samples for the tracer. If high concentrations (> 10%) of tracer gas are observed in a sample, the probe seal should be enhanced to reduce the infiltration of outdoor air.

Where permanent or semi-permanent sampling probes are used, tracer gas samples should be collected at each of the sampling probes during the initial stages of a soil vapor sampling program. If the results of the initial samples indicate that the probe seals are adequate, reducing the number of locations at which tracer gas samples are employed may be considered. At a minimum, tracer gas samples should be collected with at least 10% of the soil vapor samples collected in subsequent sampling rounds. When using permanent soil vapor probes as part of a long-term monitoring program, annual testing of the probe integrity is recommended. Where temporary probes are used, tracer gas should be used at every sampling location, every time.

Appendix B
Indoor air quality questionnaire and building inventory

As discussed in Section 2.11, products in buildings should be inventoried every time indoor air is sampled to provide an accurate assessment of the potential contribution of volatile chemicals. In addition, the type of structure, floor layout and physical conditions of the building being studied should be noted to identify (and minimize) conditions that may interfere with the proposed testing.

Toward this end, a blank copy of the NYSDOH Center for Environmental Health's Indoor Air Quality Questionnaire and Building Inventory is provided in this appendix. Also provided is an example that demonstrates how the form should be completed properly.

This page is intentionally blank.

NEW YORK STATE DEPARTMENT OF HEALTH
INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY
CENTER FOR ENVIRONMENTAL HEALTH

This form must be completed for each residence involved in indoor air testing.

Preparer's Name _____ Date/Time Prepared _____

Preparer's Affiliation _____ Phone No._____

Purpose of Investigation_____

1. OCCUPANT:

Interviewed: Y / N

Last Name: _____ First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

Number of Occupants/persons at this location _____ Age of Occupants _____

2. OWNER OR LANDLORD: (Check if same as occupant ___)

Interviewed: Y / N

Last Name: _____First Name: _____

Address: _____

County: _____

Home Phone: _____ Office Phone: _____

3. BUILDING CHARACTERISTICS

Type of Building: (Circle appropriate response)

Residential	School	Commercial/Multi-use
Industrial	Church	Other: _____

If the property is residential, type? (Circle appropriate response)

Ranch	2-Family	3-Family
Raised Ranch	Split Level	Colonial
Cape Cod	Contemporary	Mobile Home
Duplex	Apartment House	Townhouses/Condos
Modular	Log Home	Other:_____

If multiple units, how many? _____

If the property is commercial, type?

Business Type(s) _____

Does it include residences (i.e., multi-use)? Y / N If yes, how many? _____

Other characteristics:

Number of floors_____ Building age_____

Is the building insulated? Y / N How air tight? Tight / Average / Not Tight

4. AIRFLOW

Use air current tubes or tracer smoke to evaluate airflow patterns and qualitatively describe:

Airflow between floors

_____

_____

_____

Airflow near source

_____

_____

_____

Outdoor air infiltration

_____

_____

_____

Infiltration into air ducts

_____

_____

_____

5. BASEMENT AND CONSTRUCTION CHARACTERISTICS (Circle all that apply)

a. Above grade construction:	wood frame	concrete	stone	brick
b. Basement type:	full	crawlspace	slab	other _____
c. Basement floor:	concrete	dirt	stone	other _____
d. Basement floor:	uncovered	covered	covered with _____	
e. Concrete floor:	unsealed	sealed	sealed with _____	
f. Foundation walls:	poured	block	stone	other _____
g. Foundation walls:	unsealed	sealed	sealed with _____	
h. The basement is:	wet	damp	dry	moldy
i. The basement is:	finished	unfinished	partially finished	
j. Sump present?	Y / N			
k. Water in sump?	Y / N / not applicable			

Basement/Lowest level depth below grade: _____(feet)

Identify potential soil vapor entry points and approximate size (e.g., cracks, utility ports, drains)

_____

_____

6. HEATING, VENTING and AIR CONDITIONING (Circle all that apply)

Type of heating system(s) used in this building: (circle all that apply – note primary)

Hot air circulation	Heat pump	Hot water baseboard	
Space Heaters	Stream radiation	Radiant floor	
Electric baseboard	Wood stove	Outdoor wood boiler	Other _____

The primary type of fuel used is:

Natural Gas	Fuel Oil	Kerosene
Electric	Propane	Solar
Wood	Coal	

Domestic hot water tank fueled by: _____

Boiler/furnace located in:	Basement	Outdoors	Main Floor	Other_____
Air conditioning:	Central Air	Window units	Open Windows	None

Are there air distribution ducts present? Y / N

Describe the supply and cold air return ductwork, and its condition where visible, including whether there is a cold air return and the tightness of duct joints. Indicate the locations on the floor plan diagram.

_____

_____

_____

_____

7. OCCUPANCY

Is basement/lowest level occupied? Full-time Occasionally Seldom Almost Never

Level	**General Use of Each Floor (e.g., familyroom, bedroom, laundry, workshop, storage)**
Basement	_____
1st Floor	_____
2nd Floor	_____
3rd Floor	_____
4th Floor	_____

8. FACTORS THAT MAY INFLUENCE INDOOR AIR QUALITY

a. Is there an attached garage? Y / N

b. Does the garage have a separate heating unit? Y / N / NA

c. Are petroleum-powered machines or vehicles stored in the garage (e.g., lawnmower, atv, car) Y / N / NA Please specify_____

d. Has the building ever had a fire? Y / N When?_____

e. Is a kerosene or unvented gas space heater present? Y / N Where? _____

f. Is there a workshop or hobby/craft area? Y / N Where & Type? _____

g. Is there smoking in the building? Y / N How frequently? _____

h. Have cleaning products been used recently? Y / N When & Type? _____

i. Have cosmetic products been used recently? Y / N When & Type? _____

j. Has painting/staining been done in the last 6 months? Y / N Where & When? _____

k. Is there new carpet, drapes or other textiles? Y / N Where & When? _____

l. Have air fresheners been used recently? Y / N When & Type? _____

m. Is there a kitchen exhaust fan? Y / N If yes, where vented?_____

n. Is there a bathroom exhaust fan? Y / N If yes, where vented?_____

o. Is there a clothes dryer? Y / N If yes, is it vented outside? Y / N

p. Has there been a pesticide application? Y / N When & Type?_____

Are there odors in the building? Y / N
If yes, please describe: _____

Do any of the building occupants use solvents at work? Y / N
(e.g., chemical manufacturing or laboratory, auto mechanic or auto body shop, painting, fuel oil delivery, boiler mechanic, pesticide application, cosmetologist

If yes, what types of solvents are used? _____

If yes, are their clothes washed at work? Y / N

Do any of the building occupants regularly use or work at a dry-cleaning service? (Circle appropriate response)

Yes, use dry-cleaning regularly (weekly) No
Yes, use dry-cleaning infrequently (monthly or less) Unknown
Yes, work at a dry-cleaning service

Is there a radon mitigation system for the building/structure? Y / N Date of Installation: _____
Is the system active or passive? Active/Passive

9. WATER AND SEWAGE

Water Supply:	Public Water	Drilled Well	Driven Well	Dug Well	Other: _____
Sewage Disposal:	Public Sewer	Septic Tank	Leach Field	Dry Well	Other: _____

10. RELOCATION INFORMATION (for oil spill residential emergency)

a. Provide reasons why relocation is recommended: _____

b. Residents choose to: remain in home relocate to friends/family relocate to hotel/motel

c. Responsibility for costs associated with reimbursement explained? Y / N

d. Relocation package provided and explained to residents? Y / N

11. FLOOR PLANS

Draw a plan view sketch of the basement and first floor of the building. Indicate air sampling locations, possible indoor air pollution sources and PID meter readings. If the building does not have a basement, please note.

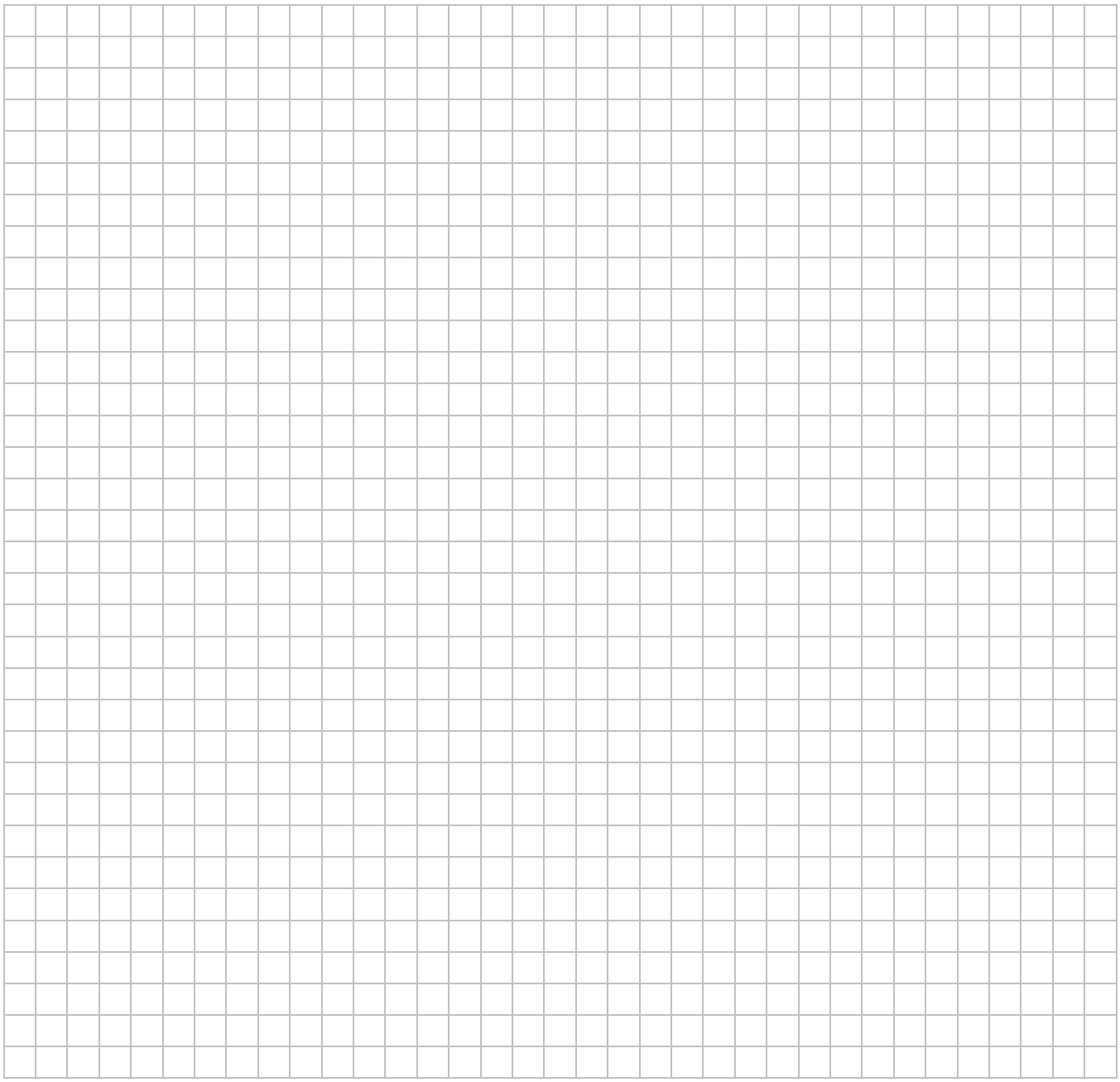
Basement:

First Floor:

12. OUTDOOR PLOT

Draw a sketch of the area surrounding the building being sampled. If applicable, provide information on spill locations, potential air contamination sources (industries, gas stations, repair shops, landfills, etc.), outdoor air sampling location(s) and PID meter readings.

Also indicate compass direction, wind direction and speed during sampling, the locations of the well and septic system, if applicable, and a qualifying statement to help locate the site on a topographic map.



13. PRODUCT INVENTORY FORM

Make & Model of field instrument used: _____

List specific products found in the residence that have the potential to affect indoor air quality.

Location	Product Description	Size (units)	Condition*	Chemical Ingredients	Field Instrument Reading (units)	Photo** Y / N

* Describe the condition of the product containers as **Unopened (UO), Used (U),** or **Deteriorated (D)**
** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.

OSR – 3 Example 1 Correct

NEW YORK STATE DEPARTMENT OF HEALTH
INDOOR AIR QUALITY QUESTIONNAIRE AND BUILDING INVENTORY
CENTER FOR ENVIRONMENTAL HEALTH

This form must be completed for each residence involved in indoor air testing.

Preparer's Name Mary Jones Date/Time Prepared 10/22/04 10:00am

Preparer's Affiliation XYZ Consulting Phone No. 518-555-1212

Purpose of Investigation Thomasville Soil Vapor Intrusion Investigation (Site#32141)

1. OCCUPANT:

Interviewed: (Y)/ N

Last Name: Smith First Name: Carol

Address: 25 Main Street Thomasville, New York 25230

County: Albany

Home Phone: 518-556-2222 Office Phone: 518-556-2400

Number of Occupants/persons at this location 2 Age of Occupants 36, 10

2. OWNER OR LANDLORD: (Check if same as occupant ___)

Interviewed: Y (N)

Last Name: White First Name: Frank

Address: 64 Mountain Road Bainbridge, New York 26390

County: Dutchess

Home Phone: 845-876-1301 Office Phone: 845-227-2430

3. BUILDING CHARACTERISTICS

Type of Building: (Circle appropriate response)

(Residential)	School	Commercial/Multi-Use
Industrial	Church	Other: _____

Example Correct 2

If the property is residential, type? (Circle appropriate response)

(Ranch)	2-Family	3-Family
Raised Ranch	Split Level	Colonial
Cape Cod	Contemporary	Mobile Home
Duplex	Apartment House	Townhouses/Condos
Modular	Log Home	Other:_____

If multiple units, how many? NA

If the property is commercial, type?

Business Type(s) NA

Does it include residences (i.e. multi-use)? Y / N If yes, how many? _____

Other characteristics:

Number of floors 1 Building age 20 years

Is the building insulated? (Y) / N How air tight? (Tight) / Average / Not Tight

4. AIRFLOW

Use air current tubes or tracer smoke to evaluate airflow patterns and qualitatively describe:

Airflow between floors

Basement air flows up to 1st floor through plumbing waste line and domestic water line floor penetrations

Airflow near source

Yes, furnace/oil tank area open to rest of basement

Outdoor air infiltration

Outdoor air enters at loose bilco doorway openings, and at sill plate near furnace.

Infiltration into air ducts

Basement air flows into bottom of hot air unit and in loose cold air return joints.

Example Correct

5. BASEMENT AND CONSTRUCTION CHARACTERISTICS (Circle all that apply)

a. Above grade construction:	(wood frame)	concrete	stone	brick
b. Basement type:	(full)	crawlspace	slab	other _____
c. Basement floor:	(concrete)	dirt	stone	other _____
d. Basement floor:	(uncovered)	covered	covered with _____	
e. Concrete floor:	(unsealed)	sealed	sealed with _____	
f. Foundation walls:	(poured)	block	stone	other _____
g. Foundation walls:	(unsealed)	sealed	sealed with _____	
h. The basement is:	wet	damp	(dry)	moldy
i. The basement is:	finished	(unfinished)	partially finished	
j. Sump present?	Y (N)			
k. Water in sump?	Y / N / (not applicable)			

Basement/Lowest level depth below grade: 6 (feet)

Identify potential soil vapor entry points and approximate size (e.g., cracks, utility ports, drains)

Floor drain in laundry area

6. HEATING, VENTING and AIR CONDITIONING (Circle all that apply)

Type of heating system(s) used in this building: (circle all that apply – note primary)

(Hot air circulation)	Heat pump	Hot water baseboard	
Space Heaters	Stream radiation	Radiant floor	
Electric baseboard	Wood stove	Outdoor wood boiler	Other _____

The primary type of fuel used is:

Natural Gas	(Fuel Oil)	Kerosene
Electric	Propane	Solar
Wood	Coal	

Domestic hot water tank fueled by: gas

Boiler/furnace located in:	(Basement)	Outdoors	Main Floor	Other _____
Air Conditioning:	Central Air	(Window units)	Open Windows	None

Example Correct 4

Are there air distribution ducts present? (Y) N

Describe the supply and cold air return ductwork, and its condition where visible, including whether there is a cold air return and the tightness of duct joints. Indicate the locations on the floor plan diagram.

Cold air return ductwork on ceiling in basement. Cold air return joints appear loose.

7. OCCUPANCY

Basement / Is lowest level occupied? Full time Occasionally (Seldom) Almost Never

Level	**General Use of Each Floor (e.g., familyroom, bedroom, laundry, workshop, storage)**
Basement	Storage and laundry
1st Floor	living area and bedrooms
2nd Floor	
3rd Floor	
4th Floor	

8. FACTORS THAT MAY INFLUENCE INDOOR AIR QUALITY

a. Is there an attached garage? (Y) N

b. Does the garage have a separate heating unit? Y (N) NA

c. Are petroleum-powered machines or vehicles stored in the garage (e.g., lawnmower, atv, car etc.) (Y) N / NA Please specify lawnmower, car

d. Has the building ever had a fire? Y (N) When?_____

e. Is a kerosene or unvented gas space heater present? Y (N) Where?_____

f. Is there a workshop or hobby/craft area? Y (N) Where & Type? _____

g. Is there smoking in the building? Y (N) How frequently? _____

h. Have cleaning products been used recently? (Y) N When & Type? w/in week - windex, tilex

i. Have cosmetic products been used recently? (Y) N When & Type? yesterday - hairspray

Example Correct

j. Has painting/staining been done in the last 6 months? Y / (N) Where & When? _____

k. Is there new carpet, drapes or other textiles? (Y) / N Where & When? carpet in dining room

l. Have air fresheners been used recently? Y / (N) When & Type? _____

m. Is there a kitchen exhaust fan? (Y) / N If yes, where vented? outside

n. Is there a bathroom exhaust fan? Y / (N) If yes, where vented? _____

o. Is there a clothes dryer? (Y) / N If yes, is it vented outside? (Y) / N

p. Has there been a pesticide application? Y / (N) When & Type? _____

Are there odors in the building? Y / (N)
If yes, please describe: _____

Do any of the building occupants use solvents at work? (Y) / N
(e.g., chemical manufacturing or laboratory, automechanic or autobody shop, painting, fuel oil delivery, boiler mechanic, pesticide application, cosmetologist etc.)

If yes, what types of solvents are used? hair salon dyes, alcohols, peroxides, acetone

If yes, are their clothes washed at work? Y / (N)

Do any of the building occupants regularly use or work at a dry-cleaning service? (Circle appropriate response)

Yes, use dry-cleaning regularly (weekly) — No
(Yes, use dry-cleaning infrequently (monthly or less)) — Unknown
Yes, work at a dry-cleaning service

Is there a radon mitigation system for the building/structure? (Y) / N Date of Installation: June 2000
Is the system active or passive? (Active)/Passive

9. WATER AND SEWAGE

Water Supply:	Public Water	(Drilled Well)	Driven Well	Dug Well	Other: _____
Sewage Disposal:	Public Sewer	(Septic Tank)	Leach Field	Dry Well	Other: _____

10. RELOCATION INFORMATION (for oil spill residential emergency)

a. Provide reasons why relocation is recommended: not applicable

b. Residents choose to: remain in home relocate to friends/family relocate to hotel/motel

c. Responsibility for costs associated with reimbursement explained? Y / N

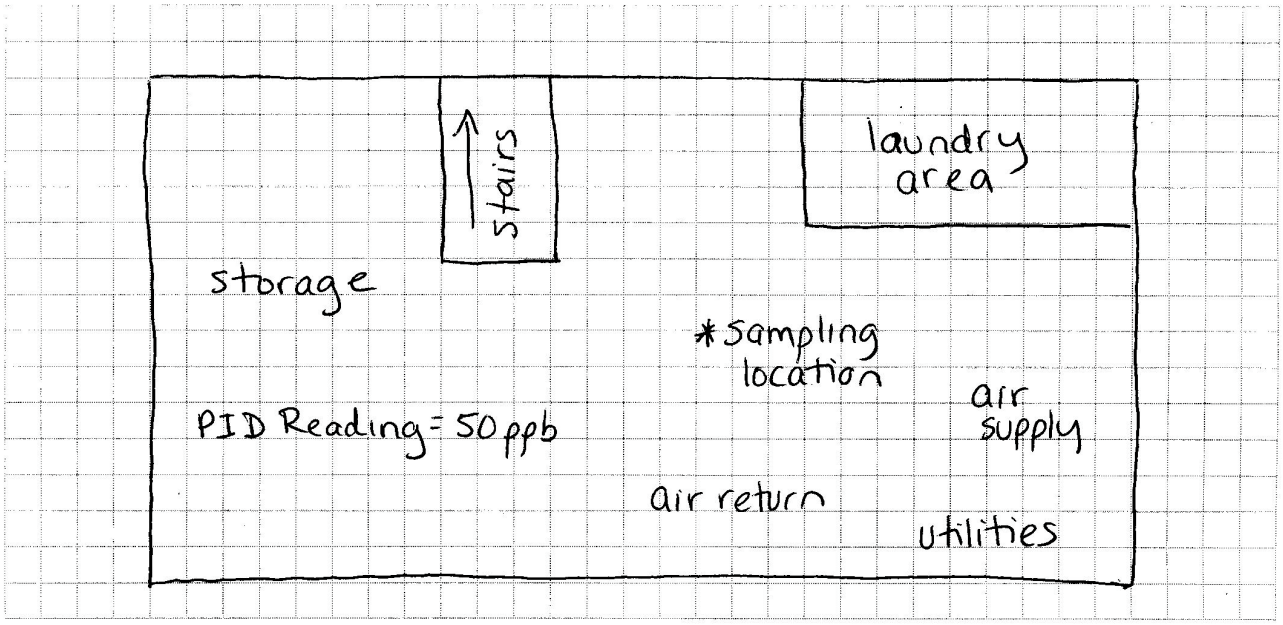
d. Relocation package provided and explained to residents? Y / N

Example Correct

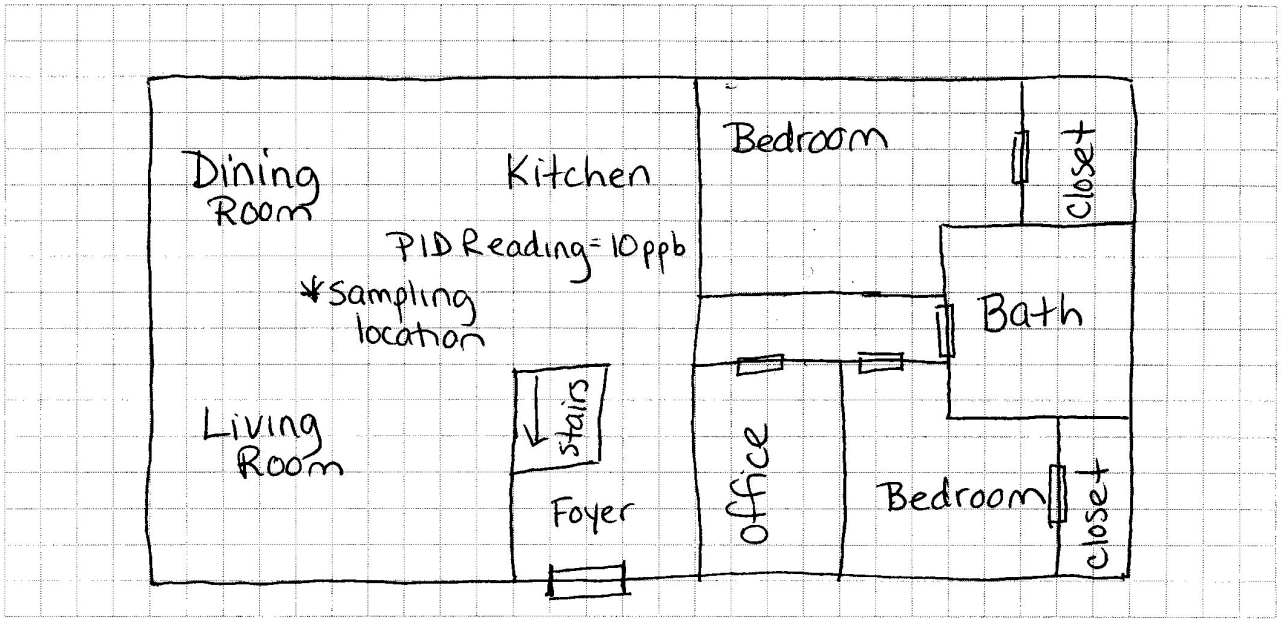
11. FLOOR PLANS

Draw a plan view sketch of the basement and first floor of the building. Indicate air sampling locations, possible indoor air pollution sources and PID meter readings. If the building does not have a basement, please note.

Basement:



First Floor:

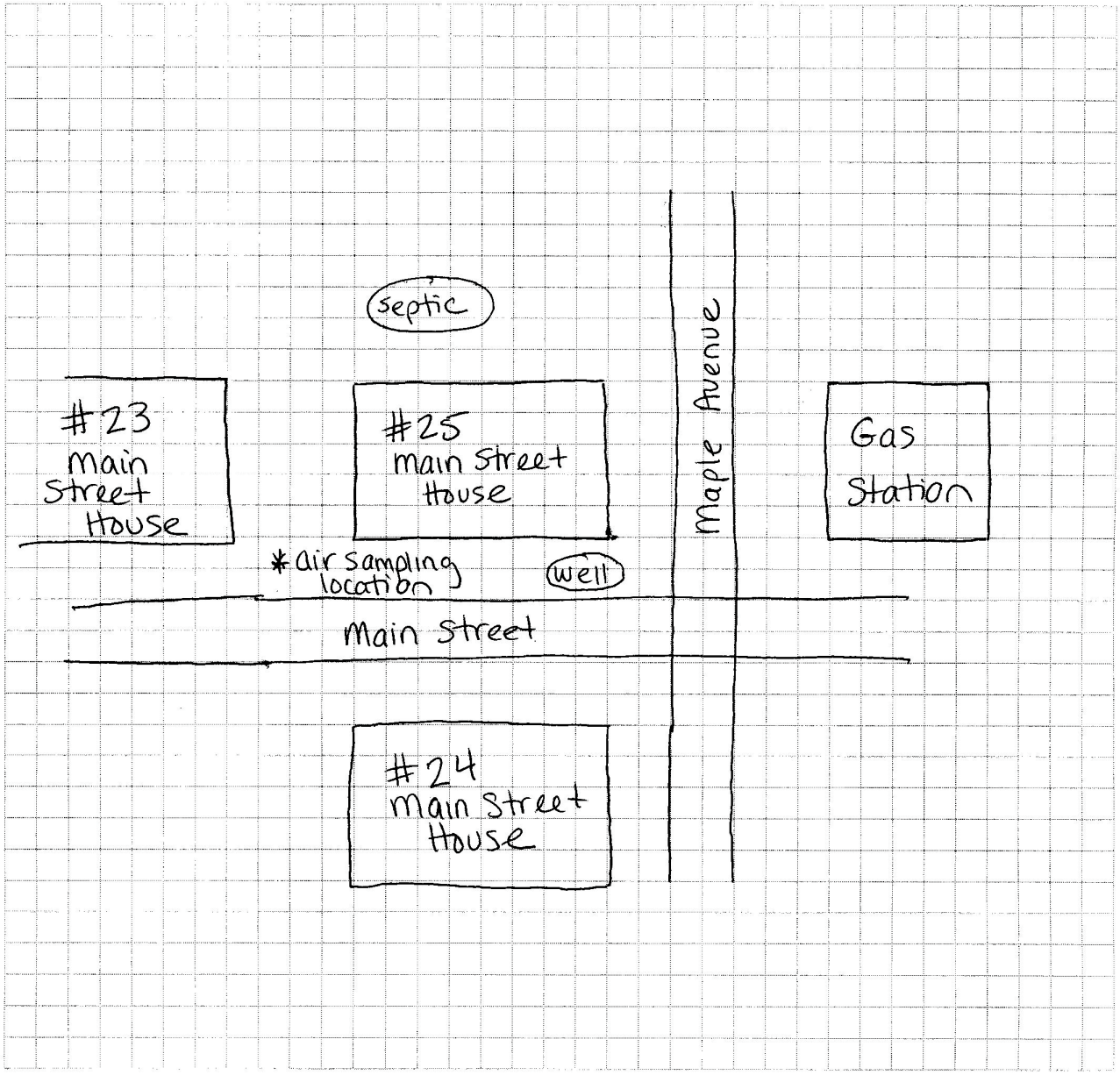


Example Correct

12. OUTDOOR PLOT

Draw a sketch of the area surrounding the building being sampled. If applicable, provide information on spill locations, potential air contamination sources (industries, gas stations, repair shops, landfills, etc.), outdoor air sampling location(s) and PID meter readings.

Also indicate compass direction, wind direction and speed during sampling, the locations of the well and septic system, if applicable, and a qualifying statement to help locate the site on a topographic map.



N

Wind direction = NE

Example Correct 8

13. PRODUCT INVENTORY FORM

Make & Model of field instrument used: RAE photoionization detector

List specific products found in the residence that have the potential to affect indoor air quality.

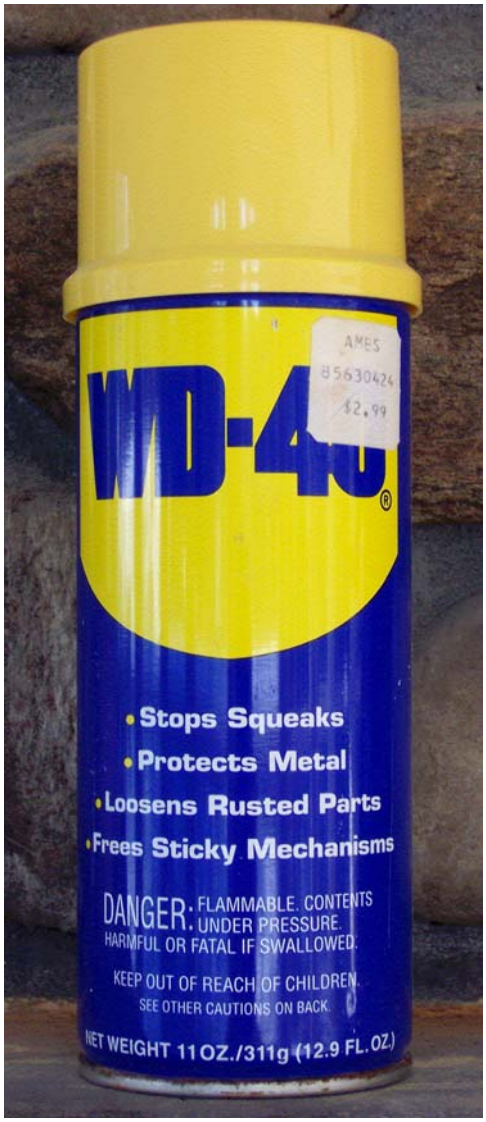
Location	Product Description	Size (oz.)	Condition*	Chemical Ingredients	Field Instrument Reading	Photo** Y / N
Kitchen	WD-40	12oz	UO	See photo	10 ppb	Y
garage	mineral spirits	24oz	U	benzene, toluene	15 ppb	N
garage	American Semi-Gloss latex paint	64oz	U	titanium dioxide, ethylene, glycol, aluminum hydroxide, 2,2,4-trimethyl 1-1,3-pentanediol isobutyrate, Vinyl acetate	2 ppb	N
garage	Krylon Semi-gloss oil paint	64oz	D	butane, propane, titanium dioxide, xylene, ethylbenzene, acetone, MEK, butanol, MIK	10 ppb	N
garage	Rustoleum	12oz	U	talc, calcium carbonate, titanium dioxide, xylene, ethylbenzene, acetone, liquified petroleum gases, pentaerythritol	4 ppb	N
garage	Deep 6 Double Strength Insect Repellent	8oz	D	propane, isobutane, N,N-Diethyl-meta-toluamide	0.5 ppb	N
				Di-n-propyl isocinchomeronate		
basement	12 cans latex paint	128oz	U	talc, titanium dioxide, Kaolin clay, 2,24-trimethyl-1,3 pentanediol isobutyrate, vinyl acetate	0	N

* Describe the condition of the product containers as **Unopened (UO), Used (U),** or **Deteriorated (D)**

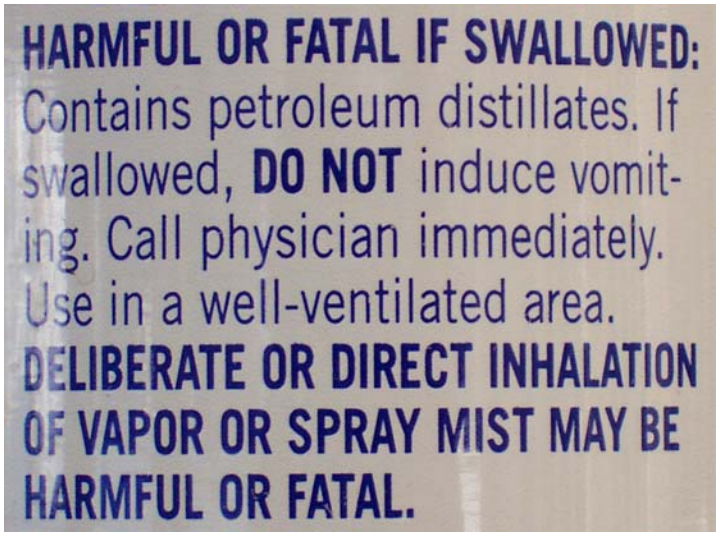
** Photographs of the **front and back** of product containers can replace the handwritten list of chemical ingredients. However, the photographs must be of good quality and ingredient labels must be legible.

Product Inventory Attachment — 25 Main Street, City

WD-40 FRONT



WD-40 INGREDIENTS



This page is intentionally blank.

APPENDIX B

SITE-SPECIFIC QUALITY ASSURANCE PROJECT PLAN (QAPjP)

QUALITY ASSURANCE PROJECT PLAN
EUGENE'S DRY CLEANERS 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 WP, 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 VI at the Eugene's Dry Cleaners Site will be taken from the following sections of the QAPP:

Section 2.0	Program Organization and Responsibilities
Section 8.3	Data Reporting
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	Subsections 4.3 and 5.0

General Water Sampling Methodology	Subsection 4.6.1
Field Instrument Calibration	Section 6.0

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

2.1 LOW FLOW OVERBURDEN GROUNDWATER SAMPLING

The following procedure was developed in accordance with the USEPA guidance document "Low Stress (low flow) Purging and Sampling Procedure for the Collection of Ground Water Samples from Monitoring Wells", dated July 30, 1996. This procedure includes a one-saturated well volume volumetric purge requirement to be instituted when monitoring wells that do not have dedicated equipment. Initial insertion of dedicated equipment and non-dedicated sampling equipment commonly causes mixing of the water column and increases the time frame to achieve stabilized parameters. The volumetric purge requirement is most applicable to lower yielding formations, and should be considered as a good practice to insure sample integrity, although it is not a specific requirement of EPA guidance. A Low Flow Groundwater Sampling Data Sheet will be completed for each monitoring well sample.

BASIC MATERIALS AND EQUIPMENT REQUIRED

- Geopump™ or Bladder Pump with Teflon™ or Teflon™ lined tubing capable of reaching the estimated depth of the well screen;
- Air compressor or compressed gas for bladder pump power supply;
- Water quality unit(s) capable of measuring pH, temperature, specific conductance, dissolved oxygen, redox potential and turbidity;
- Water level meter;
- Photoionization Detector;
- Graduated measuring device and stopwatch;
- Sample bottles and labels;
- Calculator, field data sheets, and logbook; and
- Well construction data.

PROCEDURE

1. Remove well cap and immediately measure VOC concentrations at the well mouth using a PID.
2. If the well casing does not have a reference point [usually an indelible ink mark on the highest rim of the PVC casing], make one, and document it in the field logbook.
3. A static water level measurement will be collected using the top of riser as a reference point. Submersion of the water level meter probe should be minimized within the standing water column to avoid disturbance of colloidal particles.
4. The pump will be lowered into the water column so that the pump intake is located at the mid-point of the saturated screen interval. The pump should be lowered slowly into the water column to minimize the amount of mixing in the well. The discharge line should be secured to minimize movement of the pump during sampling activities.
5. Assemble air lines, bladder pump control box, and in-line water quality monitoring system for bladder pump. Assemble tubing and in-line water quality monitoring system for peristaltic pump. The water quality system should include the following parameters monitored in-line: pH, temperature, specific conductance, redox potential, dissolved oxygen. Turbidity will be monitored separately from those parameters monitored in-line.
6. The depth to water in the well will be re-measured after pump insertion and compared to the initial water level measurement; if the readings vary by greater than 0.5 feet, wait a period of 5 minutes and re-measure the water level and document the measurement before purging is initiated.
7. The initial purging rate should be at the lowest rate obtainable with the pump. The pump start time should be recorded and the flow rate will be measured and recorded using a graduated measuring device and a stopwatch. Purging rates should not exceed 500 ml per minute. During the initial period of pumping, an estimated 5 to 10 minutes, the depth to water in the well should be measured frequently (approximately once per minute) to enable timely pumping rate adjustments in attempts to minimize significant drawdown (i.e., =0.3 feet) in the well. If significant drawdown is observed, pumping rates should be decreased until drawdown is no longer occurring.
8. The initial groundwater sample discharged from the tubing will be monitored for in-line field parameters as described above and documented along with start time a Low Flow Groundwater Sampling Data Sheet.
9. In-line field parameters (as depicted in step 5) and the depth to water will be measured at five minute intervals (initially the water level will be measured more frequently as described in step 7). The data and the associated time will be documented on the Low Flow Groundwater Sampling Data Sheet. Attempts will be made to minimize the drawdown in the well during pumping to less than 0.3 feet, by adjusting the pump flow rate. Drawdown for each well will vary depending on the recharge capacity of the overburden and bedrock units.
10. During pump start-up, drawdown may exceed the 0.3 feet target and recover as flow adjustments are made. Purge volume calculations should include the stabilized drawdown value, not the initial drawdown. Do not allow the water level to fall below the intake of the pump (if the static water level is above the well screen, do not allow the water level to fall

below the top of the well screen). The final purge volume must be greater than one saturated screen volume, plus the stabilized drawdown volume, plus the extraction of the tubing volume.

11. Purging requirements are met once at least one saturated screen interval has been removed and when in-line (collected via a flow through cell) water quality readings (three consecutive readings at five minute intervals) meet the following criteria:

    - Turbidity (± 10% for values greater than 5 NTU);
    - Temperature (± 10%);
    - Dissolved Oxygen (±10%);
    - Specific Conductance (±3%);
    - pH (± 0.1 unit); and
    - Redox Potential (± 10 millivolts).

    If the final drawdown measures greater than 0.3 feet, the volume of water drawdown will be calculated and the calculated volume purged in addition to the one saturated screen volume.

    If the above criteria are not achieved, due to excessive drawdown, drawdown below the pump intake or excessive purging (> 1 hours) without stabilization of water quality measurements, alternative sampling procedures can be initiated. Details of reasons why low flow criteria were not obtainable should be clearly documented in the log book and on the sample sheet. The following three options may be implemented, depending on the specific situation.

    a) Continue purging until parameter stabilization is achieved.
    b) Discontinue purging activities and do not collect a sample.
    c) Discontinue purging and collect samples documenting in the field logs the circumstances surrounding the sample collection.

    If, while purging, the recharge rate is less than the lowest pumping rate obtainable with the pump, purge the saturated interval to dryness regardless of the water quality measurements. The well should be sampled as soon as the water level has recovered sufficiently to collect the appropriate volume needed for all anticipated samples (ideally the intake should not be moved during this recovery period). Samples may then be collected regardless of field water quality parameter readings.

12. Following purging procedures, the flow through cell will be disconnected, the flow rate re-adjusted to approximately 100 milliliter per minute (ml/minute). Samples will then be collected directly through the pump/tubing in the appropriate sample bottles.

VOC samples should be collected first and directly into pre-preserved sample containers. Fill all sample containers by allowing the pump discharge to flow gently down the inside of the container with minimal disturbance.

During purging and sampling, the tubing should remain filled with water so as to minimize possible changes in water chemistry upon contact with the atmosphere. If the sampling tube is not completely filled to the sampling point, use one of the following procedures to collect the samples, 1) add a clamp, connector (Teflon or stainless steel) or valve to constrict the discharge end of the tubing; 2) insert a small diameter Teflon tube into the discharge end of the pump tubing, collect samples from the insert tubing. 3) collect non-VOC samples first, and then increase the flow rate slightly until the water completely fills the tubing, collect samples and document the new flow rate, water quality readings, and associated drawdown measurements.

If sample containers are not pre-preserved, add preservatives immediately after sample collection. Check pH value (with pH paper) all preserved samples to ensure proper preservation. Do not check VOC samples or other samples with zero headspace.

If filtered samples are to be collected, collect samples using the same low flow technique. The filter should be pre-rinsed with 25-50 ml of groundwater prior to sample collection. The flow rate may have to be increased due to restrictions to flow subsequent to filter placement on the discharge line.

Label each sample with the appropriate sample identification code, sample date, and time of the last sample collected sample time. Samples requiring cooling (i.e., VOCs) will be placed in a cooler immediately after collection and kept at a temperature of 4 degrees Celsius until relinquished to the on-site laboratory or sample manager.

13. The bladder pump will then be removed and decontaminated using the following procedure: flushed with a Liquinox and potable water mixture (approximately 3 gallons), rinsed with potable water (approximately 3 gallons) and rinsed with deionized water (approximately 3 gallons). The peristaltic pump will be removed and tubing decontaminated using the following procedure: flushed with a Liquinox and potable water mixture (approximately 2 gallons), rinsed with potable water (approximately 2 gallons) and rinsed with deionized water (approximately 2 gallons).

REQUIRED DOCUMENTATION

The following items represent the minimum required information to be documented in the field logbooks or field data records. Each individual shall document, in the field logbook, the following appropriate level of detail for each well location prior to setting up on the next exploration location.

- Page number, job number, well ID and date at the top of each page;
- Clock time of all water levels measurements and reference point used;
- Calculation for one purge volume and the total volume purged;
- Clock time purging initiated;
- All purging rate adjustments and clock time adjustment made;
- All in-line water quality readings (i.e., pH, temperature, specific conductance, dissolved oxygen, redox potential, and turbidity);
- Drawdown measurements;
- Analytical parameters collected and associated volumes;
- Assign sample identification code;
- Decontamination of pump;
- Brief description of any problems or occurrences; and
- Time of demobilization.

2.2 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.

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

2.3 SAMPLING AND ANALYSIS PROGRAM

Data Quality Objectives (DQOs) for Site sampling activities are summarized in Table B-1. DQOs are described in accordance with USEPA guidelines (USEPA, 1987) and the NYSDEC ASP (NYSDEC, 2000).

Analytical data requirements were established using the methods described in the ASP. Analytical methods to be used for laboratory analysis are presented in Table B-2. Laboratory quantitation limits and associated QC limits for method TO-15 are provided in Attachment 1. For air samples, the minimum detection limit required will be 1.0 ug/m^3 for all compounds with the exception of TCE and PCE, which will have minimum reporting levels of 0.25 ug/m^3. Analytical Level B deliverables as described in the ASP will be provided by the laboratory. The DUSR will be issued based on DEC guidelines (NYSDEC, 1997).

2.4 SAMPLING IDENTIFICATION

Sample identification will deviate from Subsection 4.1 of the QAPP per sample identification procedures provided in the WA (see pages 3 and 5, Appendix A).

Geoprobe locations IDs will be DP-01 to DP-xx. Each location may have multiple completion objectives (e.g. soil vapor implant with vapor sample, groundwater grab sample, and/or soil sample).

Sample IDs associated with Eugene's Dry Cleaners (EC) Site will be identified as illustrated in the following examples:

ECGW01	Geoprobe groundwater sample from location DP-01
ECPW1	Groundwater sample from existing well PW-1
ECGS01xx	Soil sample from geoprobe location DP-01 at depth xx
ECSV01	Soil vapor sample from location DP-01
ECSS01	Sub-slab soil vapor sample from structure 01
ECFA01	First-floor air sample from structure 01
ECBA01	Basement air sample from structure 01
ECAA01	Ambient air sample 01

2.5 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 IDW-generated wastes will be the responsibility of MACTEC.

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), 2000. "*Analytical Services Protocols"*; 6/00 Edition; June 2000.

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

Table B-1:

Analytical DQO Levels

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

Table B-2:

Summary of Analytical Methods

Media	Parameter	Method	Container	Preservative	Holding Time
Water	TCL VOCS	EPA Method 8260	2 (40 ml vial) Teflon-lined septa	Cool, 4 degrees Celsius	7 days
Soil	TCL VOCs	EPA Method 8260	40 ml vial (2) with Teflon-lined septa	Methanol, Cool, 4 degrees Celsius	14 d
Soil vapor/Indoor Air/Outdoor Air	TCL VOCS	USEPA Method TO-15	6 L Summa® Canister	None	14d

Notes:

TCL = target compound list

VOCs = volatile organic compounds

ATTACHMENT 1

TO-15 RLs and MDLs

05/16/06

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

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

TO-15 RLs and MDLs

05/16/06

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

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

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

APPENDIX C

HEALTH AND SAFETY PLAN

MACTEC Engineering and Consulting, PC.

HEALTH AND SAFETY PLAN

The purpose of this HASP is to protect the health and safety of on-site personnel and the surrounding community during the SVIE 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 aspects of the Site.

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. The Site tenants will also be notified.

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

Prepared by: Michael Washburn Date: 4-25-2007
*Approved by: Kendra Bavor Date: 6-18-2007

Sites:	Manfred F. J. Schulte	Job Number: 3612072084
	Street Address: 405 Jericho Turnpike, New Hyde Park, New York	
	Active Industrial Uniform	Job Number: 3612072086
	Street Address: 63 West Merrick Road, Lindenhurst, NY	
	Eugene's Dry Cleaners	Job Number: 3612072087
	Street Address: 54 East Main Street, Babylon, NY	
	Sheridan Waste Oil Company	Job Number: 3612072085
	Street Address: 114 Peconic Avenue, Medford, NY	

Proposed Date(s) of Investigation: Fall 2007

Site Description: (attach map) Four inactive hazardous waste sites with similar contaminants of concern consisting principally of chlorinated solvents.

Proposed Activity(s):	Manfred F. J. Schulte	Geoprobe drilling with groundwater and soil vapor samples and hand collected indoor air samples and sub-slab soil vapor samples (see Work Plan for details)
	Active Industrial Uniform	
	Eugene's Dry Cleaners	
	Sheridan Waste Oil Company	Soil vapor samples and hand collected indoor air samples and sub-slab soil vapor samples (see Work Plan for details)

*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
Groundwater/soil/air: PCE	25 ppm
TCE	10 ppm
TCA	350 ppm
1,1 DCA	100 ppm
1, 2 DCE	200 ppm
Groundwater: PCE	25 ppm
Vinyl Chloride	1 ppm
1, 2 DCE	200 ppm

JHAs: Check and attach all that apply:

Activity Specific JHAs:

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

Hazard Specific JHAs:

☐	Insect Stings and Bites
☐	Gasoline
☒	Working with Preservatives (Acids)
☐	
☐	
☐	
☐	
☐	
☐	
☐	
☐	
☐	

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

Chemicals	MSDS Attached?
HELIUM GAS (RENTAL CYLINDER)	☒
HCl (Preservative in glass vials)	☒
AUTO CAL SOLUTION	☒
ISOBUTYLENE - PID SPAN GAS	☒

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	☐ Concrete drilling
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	☐ _____
Environmental Hazards			
☒ None	☐ Temperature extremes ☐ Cold ☐ Heat	☐ Wet location	☐ Bio hazards (snakes, insects, spiders, poisonous plants, etc.)
☐ Explosive vapors	☐ Confined space	☐ Engulfment Hazard	☐ _____
Electrical Hazards			
☐ None	☐ Energized equipment or circuits	☒ Overhead utilities ☒ Underground utilities	☐ Wet location
Fire Hazards			
☒ None	☐ Cutting, welding, or grinding generated sparks or heat sources	☐ Flammable materials present	☐ Oxygen enriched location
Ergonomic Hazards			
☒ Lifting	☒ Bending	☐ Twisting	☒ Pulling/tugging
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	* 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 (drilling task)	☐ Ear Muffs	☐ Ear plugs and muffs	☐ Other _____

Respiratory Protection			
☐ None	☐ Dust mask	☒ Full Face APR ☐ Half Face APR	Cartridge Type: Ultra Twin Change Cartridges: 3.5 hrs

Protective Clothing			
☐ White uncoated Tyvek®	☐ Poly-coated Tyvek®	☐ Saranex®	☒ Work uniform
☐ Boot covers	☐ Reflective vest	☐ Chaps or Snake Legs	☐ Other _____

Hand Protection			
☐ None	☐ Cotton gloves	☐ Leather gloves	☐ Glove liners
☒ Outer Gloves List Type_vinyl_____	☒ Inner Gloves List Type_nitrile_____	☐ 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__Vinyl chloride____	☐ Dust Meter ☐ Respirable dust ☐ Total dust	☐ Other _____	

Air Monitoring Action Levels:

PID/FID Reading [1]	Detector Tube [1]	Dust Meter [1]	LEL[2]/O_2	Action	Level of PPE
Anything above background (ppm)	<0.5 ppm			Continue to monitor with PID	Modified Level D
22 ppm	<0.5 ppm			Continue to monitor with PID and DT	Level C (stop and re-assess)

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

PPE Selection Guidelines

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

- **Safety glasses** – general eye protection – source of hazard, typically coming from straight on, required at most sites
- **Tinted Safety Glasses** – same as above, but when working in direct sunlight. May need two both tinted and untinted if working in both sunlight and shade/overcast skys.
- **Safety goggles** – needed for splash hazard, more severe eye exposures coming from all directions. Non-vented or indirect venting for chemical splash, non-vented for hazardous gases or very fine dust, vented for larger particulates coming from all directions.
- **Face shield** – needed to protect face from cuts, burns, chemicals (corrosives or chemicals with skin notation), etc.
- **Safety boots** – needed if danger of items being dropped on foot that could injure foot
- **Hard hat** – danger from items falling on head – any overhead work, tools, equipment, etc that is above the head and could fall on head of item fails, or falls off work platform. Typically required at most sites as a general PPE
- **Thin, chemical protective inner gloves** (e.g., thin Nitrile, PVC – do not use latex – many people are allergic to latex) –needed to protect hands from incidental contact with low risk contamination at very low concentrations (ppb or low ppm concentrations in groundwater or soil) or used in combination with 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 to legs.

Work Zones:

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

XX Warning Tape around drill rig and working zone when near road
XX Visual Observations

Site Communication:

XX Verbal
____ Two-way radio
XX 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

XX Horn
____ Siren
____ Other:

EMERGENCY CONTACTS

NAME	TELEPHONE NUMBERS		DATE OF PRE-EMERGENCY NOTIFICATION (if applicable)
Fire Department:	911		
Police Department:	911		
Site Health And Safety Officer: Phil Muller	Office: 781-245-6606	Home:	
Client Contact: Brian Jankauskas	Office: 518-402-9620	Pager:	
Project Manager: John Peterson	Office: 207-775-5401	Home:	
Division EH&S Manager: Cindy Sundquist	Office:207-828-3309 (w) 207-650-7593(c)	Home: 207-892-4402	
OTHER: Ambulance	911		
Manfred F. J. Schulte Site Hospital: Long Island Jewish Medical Center	718-470-7000		
Active Industrial Uniform Site Hospital: Good Samaritan Hospital/Medical Center	516-376-3000		
Sheridan Waste Oil Company Site Hospital: Yaphank Center	516-924-4411		
Eugene's Dry Cleaners Site Hospital: Good Samaritan Hospital/Medical Center	516-376-3000		

Emergency Equipment:

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

XX	Field First Aid Kit
XX	Fire Extinguisher (ABC type) **MAY BE DRILLERS**
_____	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:

USE ENGINEERING CONTROLS TO CONTROL VISUAL DUST IF PRESENT DURING CONCRETE BORING (i.e. water surface to control dust)

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

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Name: _____ Date: _____

Routes to Emergency Medical Facilities

Manfred F. J. Schulte Site

PRIMARY HOSPITAL:

Facility Name: Long Island Jewish Medical Center
Address: 27005 76th Ave # C204, New Hyde Park, NY (2.2 miles)
Telephone Number: 718-470-7000

DIRECTIONS TO PRIMARY HOSPITAL (attach map):

1:	Start out going EAST on JERICHO TURNPIKE / NY-25 toward HILLSIDE BLVD.	0.1 miles
2:	Turn LEFT onto LAKEVILLE RD.	1.6 miles
3:	Turn LEFT onto UNION TURNPIKE.	0.1 miles
4:	Turn RIGHT onto 270TH ST.	0.2 miles
5:	Turn RIGHT onto 76TH AVE.	<0.1 miles
6:	End at **27005 76th Ave** New Hyde Park, NY 11040-1433, US	

ALTERNATE HOSPITAL:

Facility Name: South Nassau Communities Hospital
Address: 2445 Oceanside Road, Oceanside, NY (14 miles)
Telephone Number: 516-763-2030

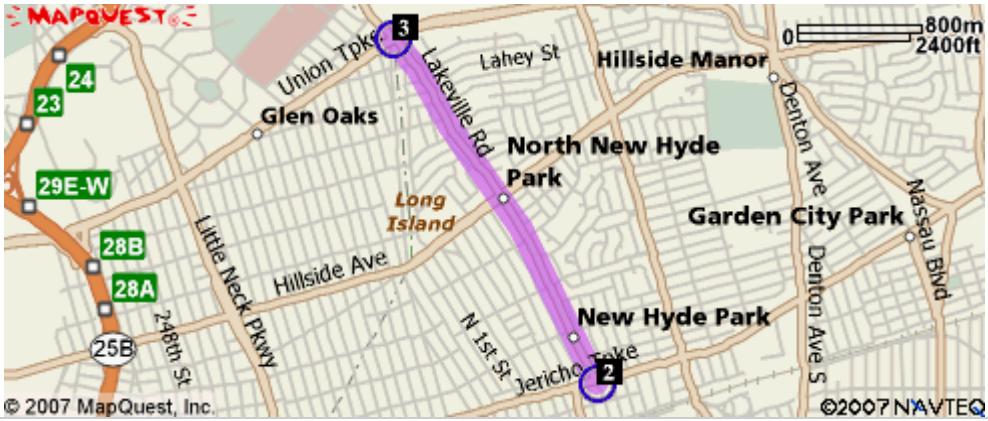
DIRECTIONS TO ALTERNATE HOSPITAL (attach map):

1:	Start out going WEST on JERICHO TURNPIKE / NY-25 toward S 4TH ST. Continue to follow JERICHO TURNPIKE.	1.9 miles
2:	Turn LEFT onto 241ST ST.	<0.1 miles
3:	Merge onto CROSS ISLAND PKWY S via the ramp on the LEFT.	2.4 miles
4:	Take the SOUTHERN STATE PKWY EAST exit- EXIT 25A- on the LEFT toward EASTERN LONG IS.	0.4 miles
5:	Merge onto SOUTHERN PKWY E / SOUTHERN STATE PKWY.	5.2 miles
6:	Take the PENINSULA BLVD SOUTH exit- EXIT 19S- toward ROCKVILLE CTR.	0.1 miles
7:	Turn RIGHT onto PENINSULA BLVD.	1.7 miles
8:	Turn LEFT onto LAKEVIEW AVE.	0.6 miles
9:	Turn RIGHT onto MORRIS AVE.	0.3 miles
10:	Turn LEFT onto SUNRISE HWY / NY-27 E / POW / MIA MEMORIAL HWY.	0.5 miles
11:	Turn RIGHT onto N OCEANSIDE RD.	0.3 miles
12:	End at **2445 Oceanside Rd** Oceanside, NY 11572-1548, US	

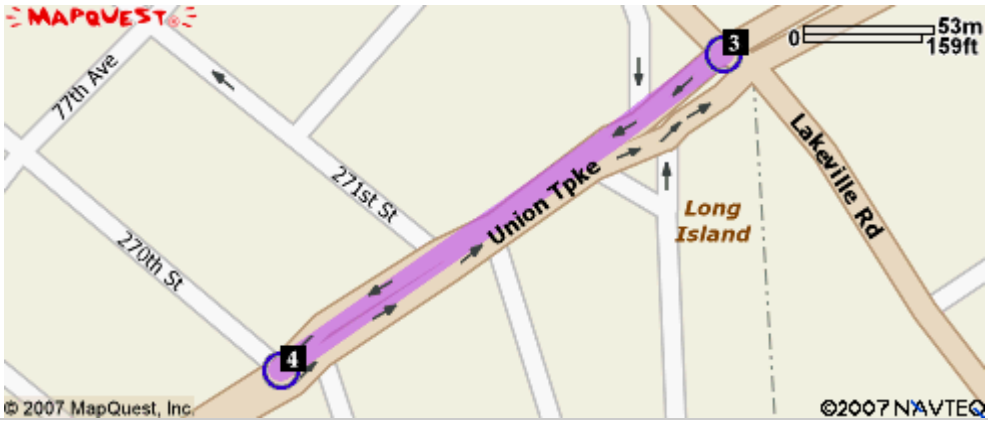
Directions to Primary Hospital:

1: Start out going EAST on JERICHO TURNPIKE / NY-25 toward HILLSIDE BLVD. 0.1 miles

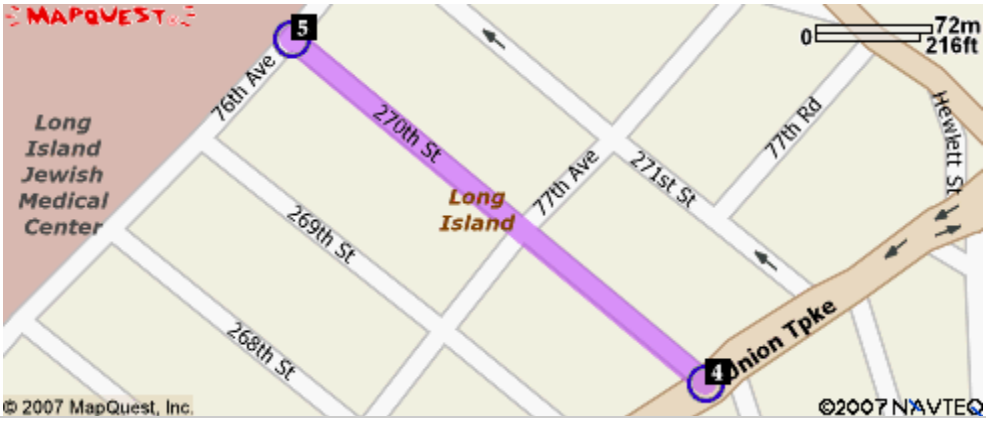
2: Turn LEFT onto LAKEVILLE RD. 1.6 miles



3: Turn LEFT onto UNION TURNPIKE. 0.1 miles



4: Turn RIGHT onto 270TH ST. 0.2 miles



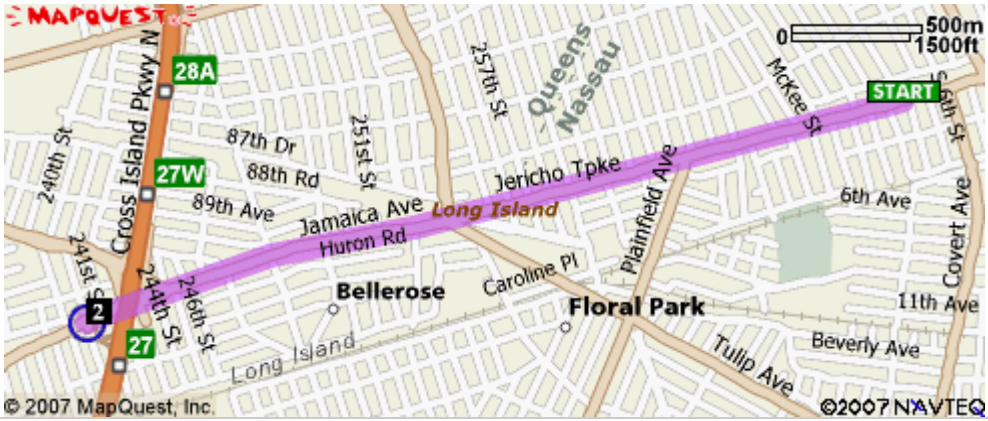
5: Turn RIGHT onto 76TH AVE. <0.1 miles

END **6:** End at **27005 76th Ave**
New Hyde Park, NY 11040-1433, US

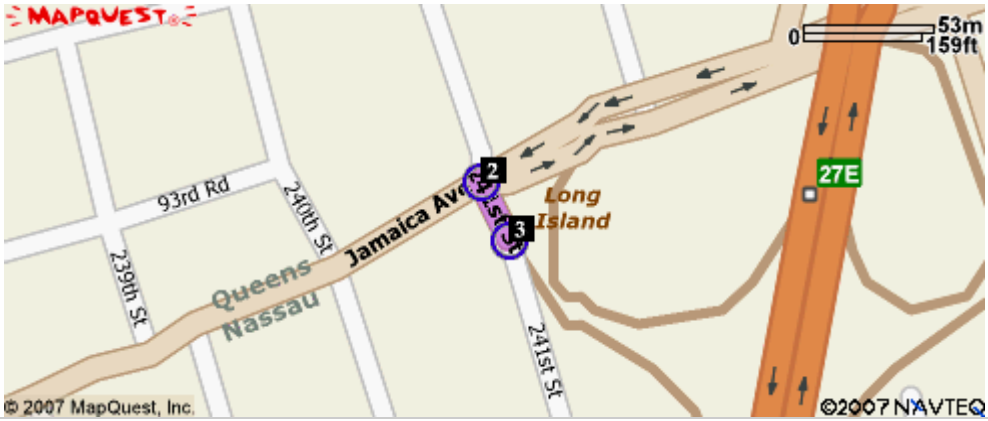
Total Est. Time: 7 minutes**Total Est. Distance:** 2.16 miles

Directions to alternate Hospital:

START **1:** Start out going WEST on JERICHO TURNPIKE / NY-25 toward S 4TH ST. Continue to follow JERICHO TURNPIKE. 1.9 miles



2: Turn LEFT onto 241ST ST. <0.1 miles



3: Merge onto CROSS ISLAND PKWY S via the ramp on the LEFT. 2.4 miles

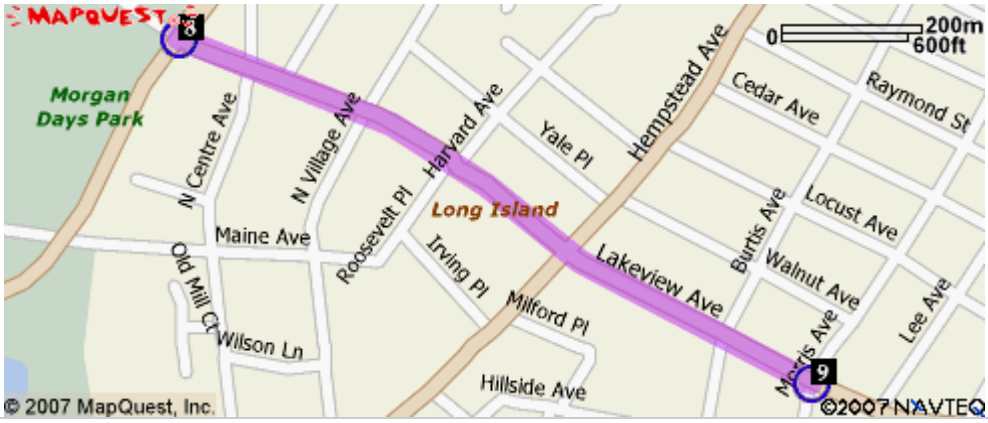
4: Take the SOUTHERN STATE PKWY EAST exit- EXIT 25A- on the LEFT toward EASTERN LONG IS. 0.4 miles

5: Merge onto SOUTHERN PKWY E / SOUTHERN STATE PKWY. 5.2 miles

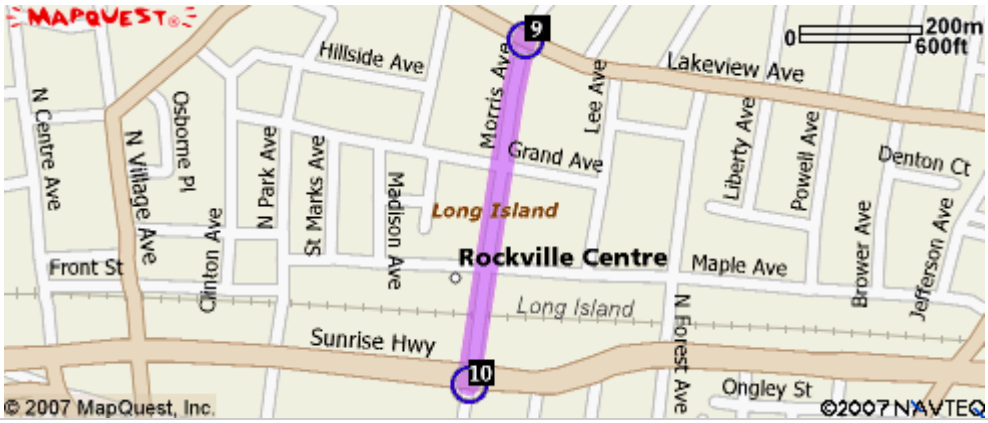
6: Take the PENINSULA BLVD SOUTH exit- EXIT 19S- toward ROCKVILLE CTR. 0.1 miles

7: Turn RIGHT onto PENINSULA BLVD. 1.7 miles

8: Turn LEFT onto LAKEVIEW AVE. 0.6 miles

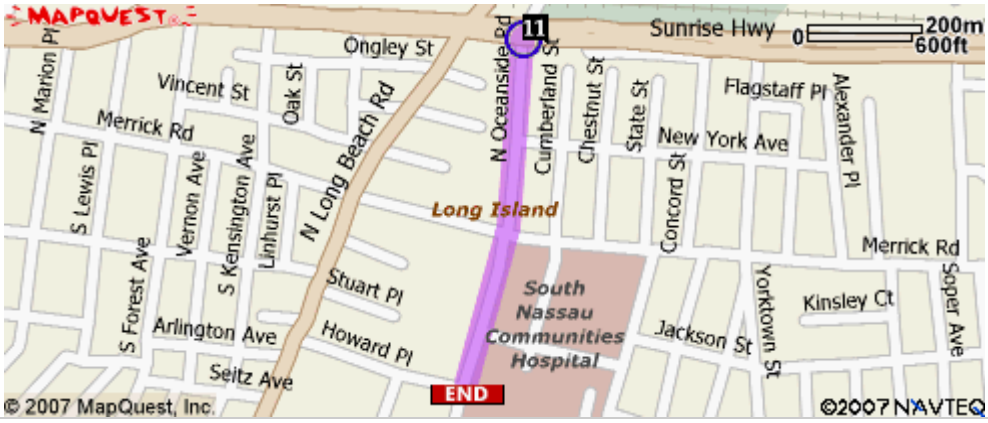


9: Turn RIGHT onto MORRIS AVE. 0.3 miles

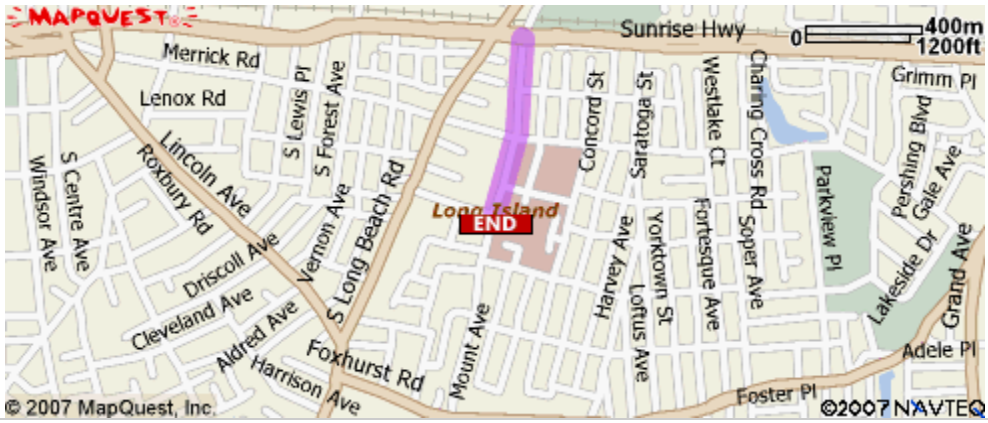


10: Turn LEFT onto SUNRISE HWY / NY-27 E / POW / MIA MEMORIAL HWY. 0.5 miles

11: Turn RIGHT onto N OCEANSIDE RD. 0.3 miles



12: End at **2445 Oceanside Rd**
Oceanside, NY 11572-1548, US



Total Est. Time: 25 minutes**Total Est. Distance:** 14.01 miles

Routes to Emergency Medical Facilities

Active Industrial Uniform

PRIMARY HOSPITAL:

Facility Name: Good Samaritan Hospital/Medical Center
Address: 1000 Montauk Highway, West Islip, NY (4.1 miles)
Telephone Number: 516-376-3000

DIRECTIONS TO PRIMARY HOSPITAL (attach map):

1:	Start out going EAST on W MONTAUK HWY / NY-27A E toward S 1ST ST.	4.1 miles
2:	End at **1000 Montauk Hwy** West Islip, NY 11795-4927, US	

ALTERNATE HOSPITAL:

Facility Name: Brunswick General Hospital Center
Address: 366 Broadway, Amityville, NY (3.4 miles)
Telephone Number: 516-789-7711

DIRECTIONS TO ALTERNATE HOSPITAL (attach map):

1:	Start out going SOUTHWEST on W MONTAUK HWY / NY-27A toward S 2ND ST.	<0.1 miles
2:	Turn RIGHT onto S 2ND ST.	0.7 miles
3:	Turn LEFT onto W HOFFMAN AVE / CR-12. Continue to follow CR-12.	1.3 miles
4:	Turn RIGHT onto GREAT NECK RD / CR-47.	0.3 miles
5:	Turn LEFT onto DIXON AVE / CR-2.	0.9 miles
6:	End at **366 Broadway** Amityville, NY 11701-2711, US	

Directions to Primary Hospital:

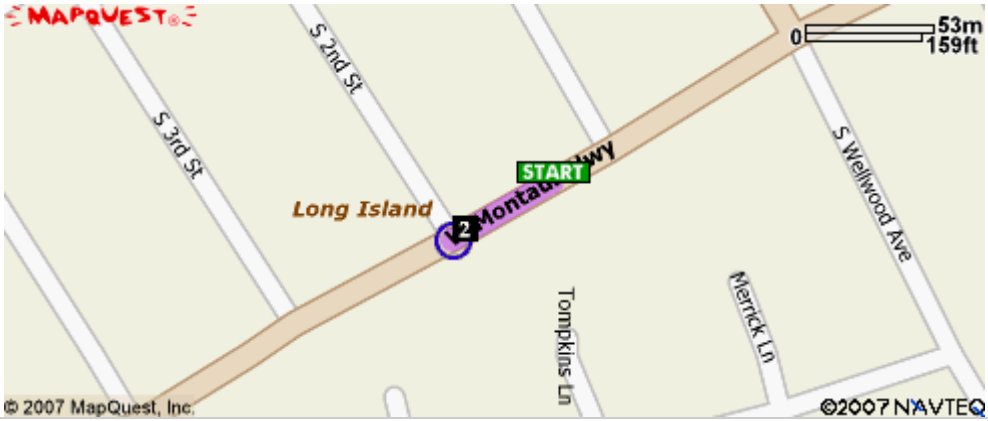
START **1:** Start out going EAST on W MONTAUK HWY / NY-27A E toward S 1ST ST. 4.1 miles

END **2:** End at **1000 Montauk Hwy**
West Islip, NY 11795-4927, US

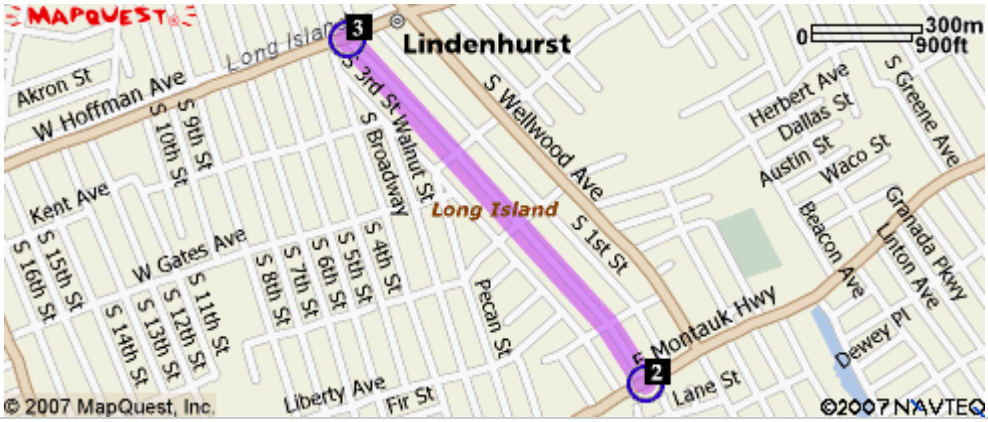
Total Est. Time: 11 minutes**Total Est. Distance:** 4.12 miles

Directions to Alternate Hospital:

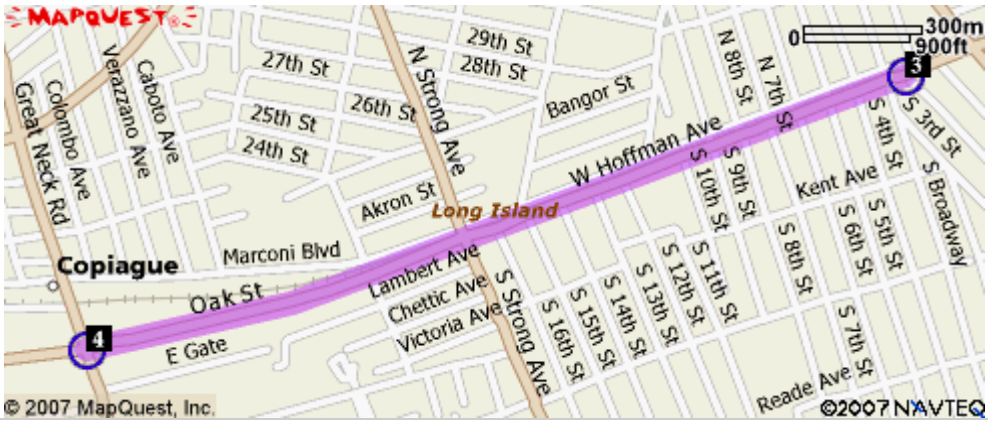
1: Start out going SOUTHWEST on W MONTAUK HWY / NY-27A toward S 2ND ST. <0.1 miles



2: Turn RIGHT onto S 2ND ST. 0.7 miles

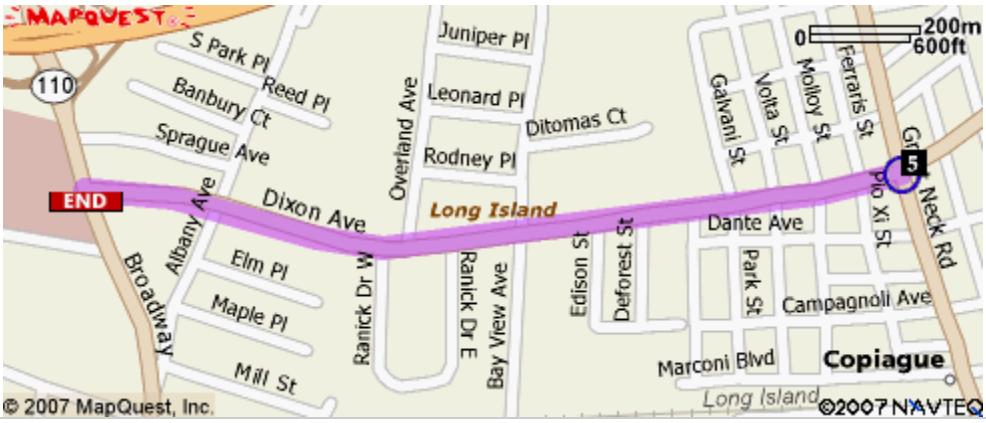


3: Turn LEFT onto W HOFFMAN AVE / CR-12. Continue to follow CR-12. 1.3 miles

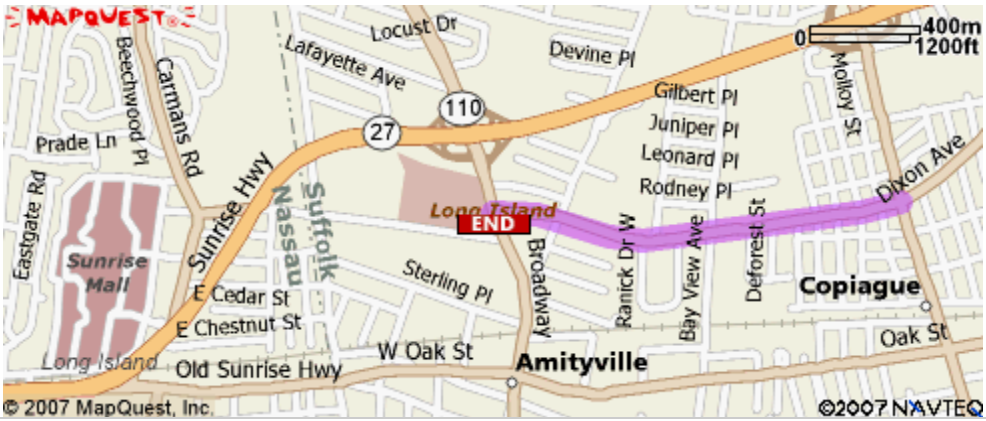


4: Turn RIGHT onto GREAT NECK RD / CR-47. 0.3 miles

5: Turn LEFT onto DIXON AVE / CR-2. 0.9 miles



6: End at **366 Broadway**
Amityville, NY 11701-2711, US



Total Est. Time: 9 minutes**Total Est. Distance:** 3.40 miles

Routes to Emergency Medical Facilities

Sheridan Waste Oil Company

PRIMARY HOSPITAL:

Facility Name: Yaphand Center
Address: 31 Scouting Blvd, Medford, NY (1.3 miles)
Telephone Number: 516-924-4411

DIRECTIONS TO PRIMARY HOSPITAL (attach map):

1:	Start out going EAST on PECONIC AVE toward KANE AVE.	0.8 miles
2:	Turn RIGHT onto HORSE BLOCK RD / CR-16.	0.3 miles
3:	Turn RIGHT onto SCOUTING BLVD / INDUSTRIAL BLVD.	0.1 miles
4:	End at **31 Scouting Blvd** Medford, NY 11763-2220, US	

ALTERNATE HOSPITAL:

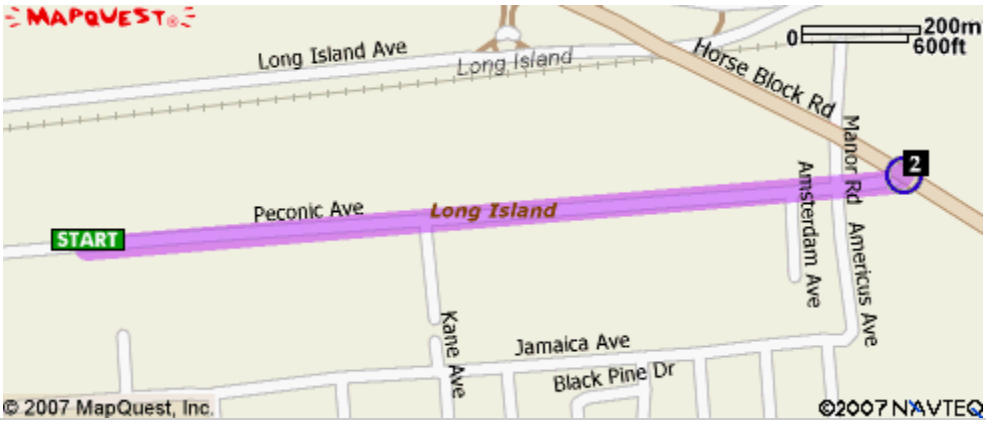
Facility Name: Brookhaven Memorial Hospital
Address: 101 Hospital Road, Patchogue, NY (4.8 miles)
Telephone Number: 516-654-7100

DIRECTIONS TO ALTERNATE HOSPITAL (attach map):

1:	Start out going EAST on PECONIC AVE toward KANE AVE.	0.8 miles
2:	Turn RIGHT onto HORSE BLOCK RD / CR-16.	0.7 miles
3:	Turn RIGHT onto PATCHOGUE YAPHANK RD / CR-101 S / SILLS RD. Continue to follow CR-101 S / SILLS RD.	2.9 miles
4:	Turn RIGHT onto BROOKHAVEN HOSPITAL RD.	0.2 miles
5:	End at **101 Hospital Rd** Patchogue, NY 11772-4870, US	

Directions to Primary Hospital:

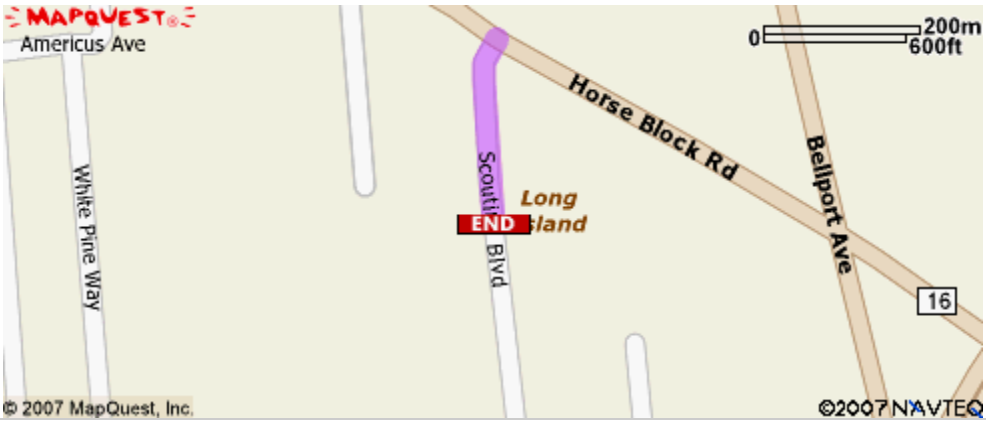
START **1:** Start out going EAST on PECONIC AVE toward KANE AVE. 0.8 miles



2: Turn RIGHT onto HORSE BLOCK RD / CR-16. 0.3 miles

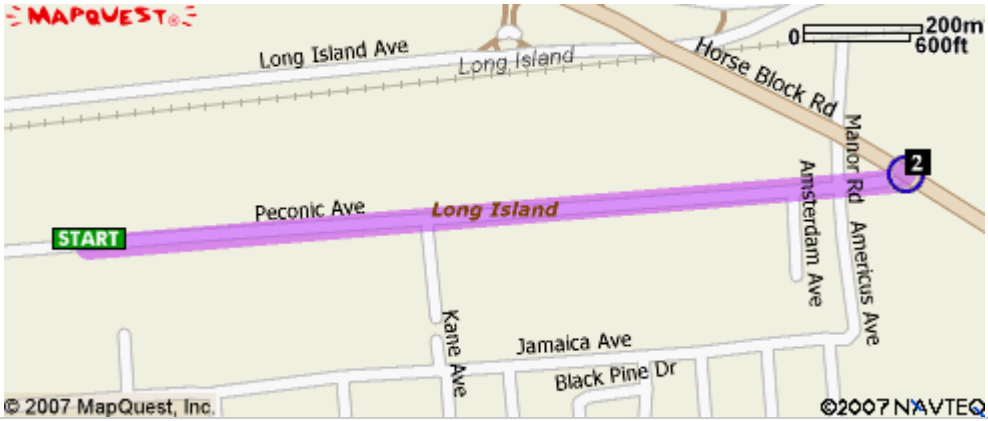
3: Turn RIGHT onto SCOUTING BLVD / INDUSTRIAL BLVD. 0.1 miles

END **4:** End at **31 Scouting Blvd**
Medford, NY 11763-2220, US

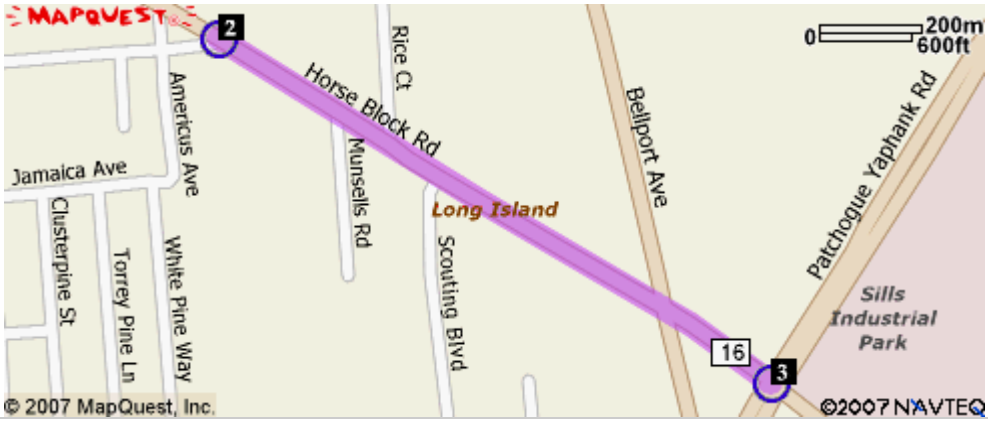


Directions to Alternate Hospital:

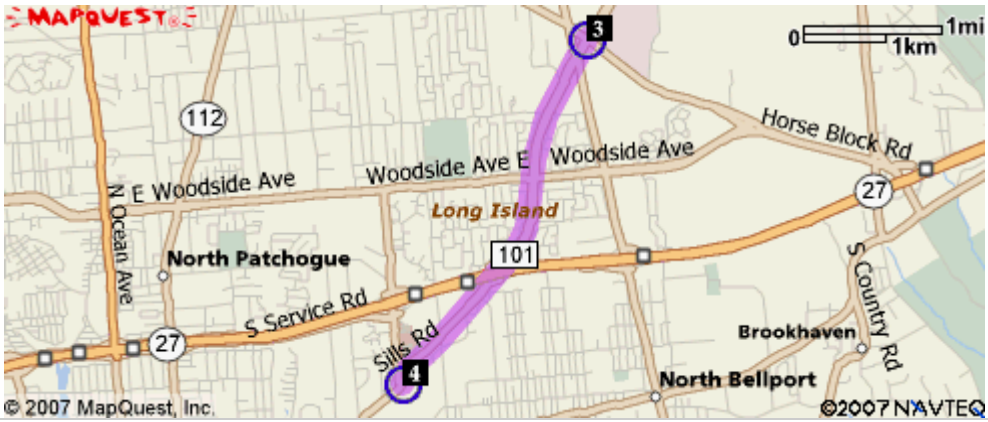
1: Start out going EAST on PECONIC AVE toward KANE AVE. 0.8 miles



2: Turn RIGHT onto HORSE BLOCK RD / CR-16. 0.7 miles

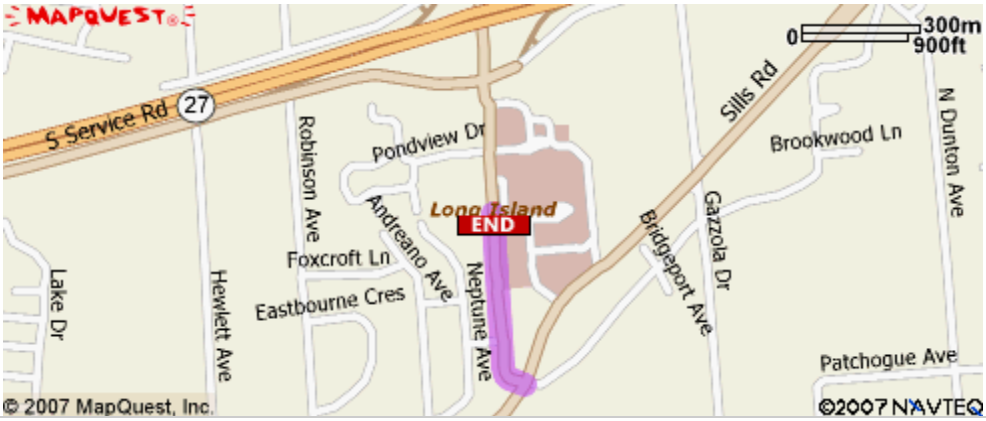


3: Turn RIGHT onto PATCHOGUE YAPHANK RD / CR-101 S / SILLS RD. Continue to follow CR-101 S / SILLS RD. 2.9 miles



4: Turn RIGHT onto BROOKHAVEN HOSPITAL RD. 0.2 miles

5: End at **101 Hospital Rd**
Patchogue, NY 11772-4870, US



Routes to Emergency Medical Facilities

Eugene’s Dry Cleaners

PRIMARY HOSPITAL:

Facility Name: Good Samaritan Hospital/Medical Center
Address: 1000 Montauk Highway, West Islip, NY (1.5 miles)
Telephone Number: 516-376-3000

DIRECTIONS TO PRIMARY HOSPITAL (attach map):

1:	Start out going EAST on E MAIN ST / NY-27A E / MONTAUK HWY toward TOTTEN PL. Continue to follow NY-27A E / MONTAUK HWY.	1.4 miles
2:	End at **1000 Montauk Hwy** West Islip, NY 11795-4927, US	

ALTERNATE HOSPITAL:

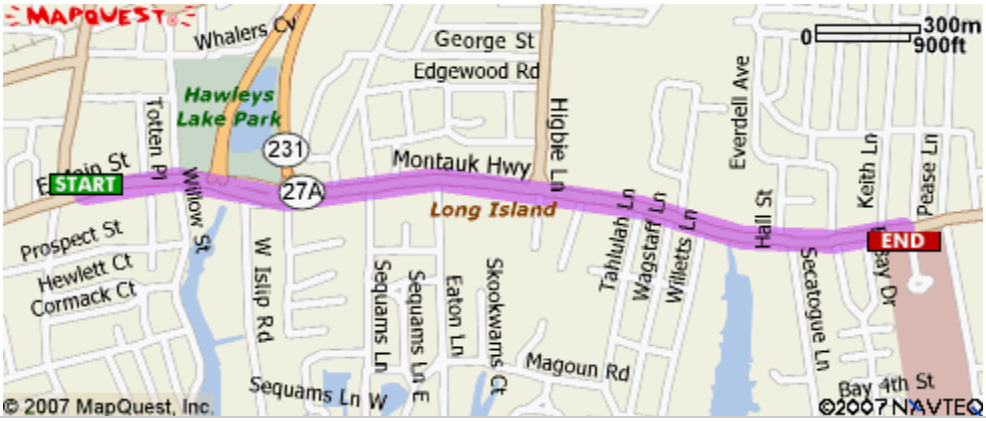
Facility Name: Brunswick General Hospital Center
Address: 366 Broadway, Amityville, NY (6.8 miles)
Telephone Number: 516-789-7711

DIRECTIONS TO ALTERNATE HOSPITAL (attach map):

1:	Start out going WEST on E MAIN ST / NY-27A / MONTAUK HWY toward DEER PARK AVE.	0.6 miles
2:	Turn RIGHT onto LITTLE EAST NECK RD N / NY-109 W. Continue to follow NY-109 W.	2.3 miles
3:	Take the ramp toward RT-27 W / NEW YORK.	0.1 miles
4:	Turn SLIGHT RIGHT onto POW / MIA MEMORIAL HWY / SUNRISE HWY.	3.3 miles
5:	Merge onto NY-110 S / BROADWAY toward AMITYVILLE.	0.3 miles
6:	End at **366 Broadway** Amityville, NY 11701-2711, US	

Directions to Primary Hospital:

START **1:** Start out going EAST on E MAIN ST / NY-27A E / MONTAUK HWY toward TOTTEN PL. 1.4 miles
Continue to follow NY-27A E / MONTAUK HWY.

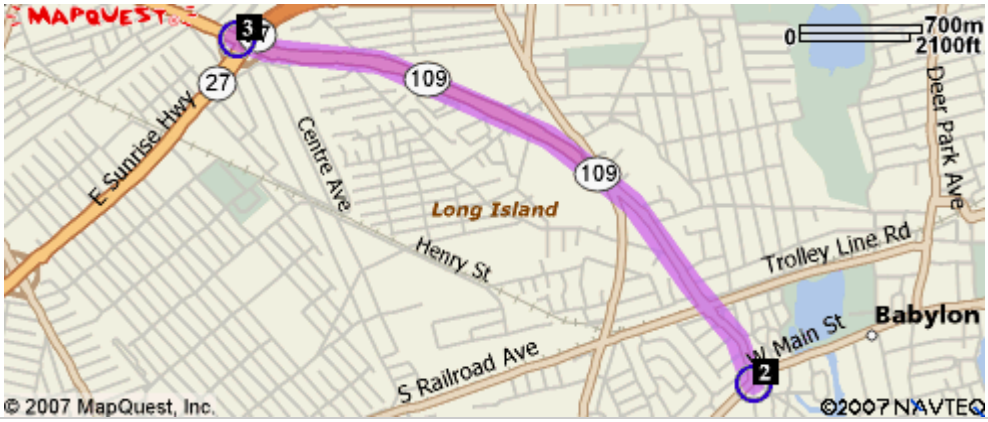


END **2:** End at **1000 Montauk Hwy**
West Islip, NY 11795-4927, US

Directions to Alternate Hospital:

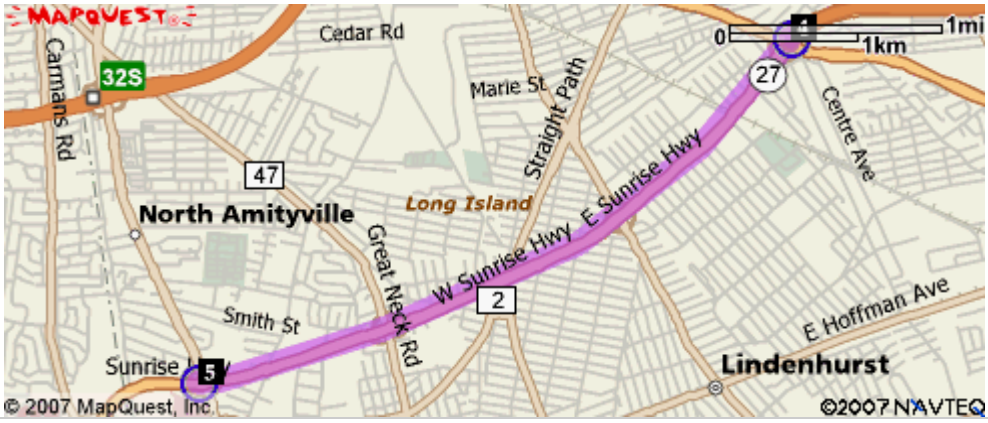
START **1:** Start out going WEST on E MAIN ST / NY-27A / MONTAUK HWY toward DEER PARK AVE. 0.6 miles

WEST 109 **2:** Turn RIGHT onto LITTLE EAST NECK RD N / NY-109 W. Continue to follow NY-109 W. 2.3 miles



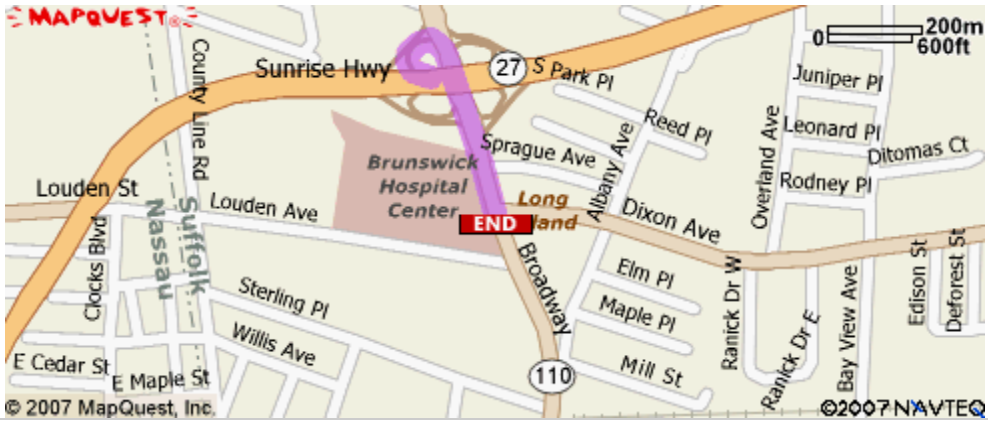
RAMP **3:** Take the ramp toward RT-27 W / NEW YORK. 0.1 miles

4: Turn SLIGHT RIGHT onto POW / MIA MEMORIAL HWY / SUNRISE HWY. 3.3 miles



5: Merge onto NY-110 S / BROADWAY toward AMITYVILLE. 0.3 miles

6: End at **366 Broadway**
Amityville, NY 11701-2711, US



Material Safety Data Sheet

Hydrochloric Acid, Reagent ACS

ACC# 95547

Section 1 - Chemical Product and Company Identification

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

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

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

Section 2 - Composition, Information on Ingredients

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

Hazard Symbols: C
Risk Phrases: 34 37

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

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

Potential Health Effects

Eye: May cause irreversible eye injury. Vapor or mist may cause irritation and severe burns. Contact with liquid is corrosive to the eyes and causes severe burns. May cause painful sensitization to light.
Skin: May be absorbed through the skin in harmful amounts. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. Contact with liquid is corrosive and causes severe burns and ulceration.
Ingestion: May cause circulatory system failure. Causes severe digestive tract burns with abdominal pain, vomiting, and possible death. May cause corrosion and permanent tissue destruction of the esophagus and digestive tract. May be harmful if swallowed.
Inhalation: May cause severe irritation of the respiratory tract with sore throat, coughing, shortness of breath and delayed lung edema. Causes chemical burns to the respiratory tract. Exposure to the mist and vapor may erode exposed teeth. Causes corrosive action on the mucous membranes.
Chronic: Prolonged or repeated skin contact may cause dermatitis. Repeated exposure may cause erosion of teeth. May cause fetal effects. Laboratory experiments have resulted in mutagenic effects. Prolonged exposure may cause conjunctivitis, photosensitization, and possible blindness.

Section 4 - First Aid Measures

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

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. During a fire, irritating and highly toxic gases may be generated by thermal

decomposition or combustion. Not flammable, but reacts with most metals to form flammable hydrogen gas. Use water spray to keep fire-exposed containers cool. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Reaction with water may generate much heat which will increase the concentration of fumes in the air. Containers may explode when heated.
Extinguishing Media: For large fires, use water spray, fog, or alcohol-resistant foam. Substance is nonflammable; use agent most appropriate to extinguish surrounding fire. Do NOT get water inside containers. Do NOT use straight streams of water. Most foams will react with the material and release corrosive/toxic gases. Cool containers with flooding quantities of water until well after fire is out. For small fires, use carbon dioxide (except for cyanides), dry chemical, dry sand, and alcohol-resistant foam.
Flash Point: Not applicable.
Autoignition Temperature: Not applicable.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 3; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

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

Section 7 - Handling and Storage

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

Section 8 - Exposure Controls, Personal Protection

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

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

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

Section 9 - Physical and Chemical Properties

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

Section 10 - Stability and Reactivity

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

Section 11 - Toxicological Information

RTECS#:
CAS# 7647-01-0: MW4025000; MW4031000
CAS# 7732-18-5: ZC0110000
LD50/LC50:
CAS# 7647-01-0:
Inhalation, mouse: LC50 = 1108 ppm/1H;
Inhalation, mouse: LC50 = 8300 mg/m3/30M;
Inhalation, rat: LC50 = 3124 ppm/1H;
Inhalation, rat: LC50 = 45000 mg/m3/5M;
Inhalation, rat: LC50 = 8300 mg/m3/30M;
Oral, rabbit: LD50 = 900 mg/kg;<BR.

CAS# 7732-18-5:
Oral, rat: LD50 = >90 mL/kg;<BR.

Carcinogenicity:
CAS# 7647-01-0:
ACGIH: A4 - Not Classifiable as a Human Carcinogen
IARC: IARC Group 3 - not classifiable CAS# 7732-18-5: Not listed by ACGIH, IARC, NIOSH, NTP, or OSHA.
Epidemiology: Experimental reproductive effects have been reported.
Teratogenicity: Embryo or Fetus: Stunted fetus, Inhalation, rat TCL0=450 mg/m3/1H Specific Developmental Abnormalities: homeostatis, Inhalation, rat TCL0=450 mg/m3/1H (female 1 days pre-mating).

Reproductive Effects: No information available.
Neurotoxicity: No information available.
Mutagenicity: Cytogenetic analysis: Hamster, lung = 30 mmol/L.; Cytogenetic analysis: Hamster, ovary = 8 mmol/L.
Other Studies: No data available.

Section 12 - Ecological Information

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

Section 13 - Disposal Considerations

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

Section 14 - Transport Information

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

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7647-01-0 is listed on the TSCA inventory.
CAS# 7732-18-5 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA

CERCLA Hazardous Substances and corresponding RQs
CAS# 7647-01-0: 5000 lb final RQ; 2270 kg final RQ
SARA Section 302 Extremely Hazardous Substances
CAS# 7647-01-0: 500 lb TPQ
SARA Codes
CAS # 7647-01-0: acute.
Section 313
This material contains Hydrochloric acid (CAS# 7647-01-0, 36 5%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.
Clean Air Act:
CAS# 7647-01-0 is listed as a hazardous air pollutant (HAP). This material does not contain any Class 1 Ozone depletors. This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
CAS# 7647-01-0 is listed as a Hazardous Substance under the CWA. None of the chemicals in this product are listed as Priority Pollutants under the CWA. None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
None of the chemicals in this product are considered highly hazardous by OSHA.
STATE
CAS# 7647-01-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
California No Significant Risk Level: None of the chemicals in this product are listed.

European / International Regulations
European Labeling in Accordance with EC Directives
Hazard Symbols:
C
Risk Phrases:
R 34 Causes burns.
R 37 Irritating to respiratory system.

Safety Phrases:
S 1/2 Keep locked up and out of reach of children.
S 26 In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S 36/37/39 Wear suitable protective clothing, gloves and eye/face protection.
S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S 9 Keep container in a well-ventilated place.

WGK (Water Danger/Protection)
CAS# 7647-01-0: 1
CAS# 7732-18-5: No information available.
Canada - DSL/NDSL
CAS# 7647-01-0 is listed on Canada's DSL List.
CAS# 7732-18-5 is listed on Canada's DSL List.
Canada - WHMIS
This product has a WHMIS classification of D1A, E.
Canadian Ingredient Disclosure List
CAS# 7647-01-0 is listed on the Canadian Ingredient Disclosure List.
Exposure Limits
CAS# 7647-01-0: OEL-AUSTRALIA:TWA 5 ppm (7 mg/m3) OEL-AUSTRIA:TWA 5 ppm (7 mg/m3) OEL-BELGIUM:STEL 5 ppm (7.7 mg/m3) OEL-DENMARK:STEL 5 ppm (7 mg/m3) OEL-FINLAND:STEL 5 ppm (7 mg/m3);Skin OEL-FRANCE:STEL 5 ppm (7.5 mg/m3) OEL-GERMANY:TWA 5 ppm (7 mg/m3) OEL-HUNGARY:STEL 5 mg/m3 OEL-JAPAN:STEL 5 ppm (7.5 mg/m3) OEL-THE NETHERLANDS:TWA 5 p pm (7 mg/m3) OEL-THE PHILIPPINES:TWA 5 ppm (7 mg/m3) OEL-POLAND:TWA 5 mg/m3 OEL-RUSSIA:STEL 5 ppm (5 mg/m3) OEL-SWEDEN:STEL 5 ppm (8 mg/ m3) OEL-SWITZERLAND:TWA 5 ppm (7.5 mg/m3);STEL 10 ppm (15 mg/m3) OEL -THAILAND:TWA 5 ppm (7 mg/m3) OEL-TURKEY:TWA 5 ppm (7 mg/m3) OEL-UNI TED KINGDOM:TWA 5 ppm (7 mg/m3);STEL 5 ppm (7 mg/m3) OEL IN BULGARIA, COLOMBIA, JORDAN, KOREA check ACGIH TLV OEL IN NEW ZEALAND, SINGAPOR E, VIETNAM check ACGI TLV

Section 16 - Additional Information

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

PRAXAIR INC -- HELIUM -- 6830-01-008-3431

MSDS Safety Information

FSC: 6830
NIIN: 01-008-3431
MSDS Date: 12/01/1992
MSDS Num: BWXRX
Tech Review: 02/14/1995
Product ID: HELIUM
Responsible Party
Cage: 0LV01
Name: PRAXAIR INC
Address: 39 OLD RIDGEBURY RD
City: DANBURY CT 06810-5113 US
Info Phone Number: 800-772-9247
Emergency Phone Number: 800-772-9247

Preparer Co. when other than Responsible Party Co.

Cage: 0LV01
Assigned Ind: N
Name: PRAXAIR, INC.
Address: 39 OLD RIDGEBURY RD
City: DANBURY CT 06810-5113

Contractor Summary

Cage: 0LV01
Name: PRAXAIR, INC.
Address: 39 OLD RIDGEBURY RD
City: DANBURY CT 06810-5113 US
Phone: 800-772-9247; 800-PRAXAIR

Item Description Information

Item Name: HELIUM,TECHNICAL
Specification Number: NK
Type/Grade/Class: NK

Ingredients

Cas: 7440-59-7
RTECS #: MH6520000
Name: HELIUM
% by Wt: 100
ACGIH TLV: SIMPLE ASPHYXIANT
Ozone Depleting Chemical: N

Health Hazards Data

Route Of Entry Inds - Inhalation: YES
Skin: NO
Ingestion: NO
Carcinogenicity Inds - NTP: NO
IARC: NO
OSHA: NO

Effects of Exposure: INHALATION: ASPHYXIANT. CAN CAUSE RAPID
SUFFOCATION/DEATH DUE TO OXYGEN DEFICIENCY.
Explanation Of Carcinogenicity: NONE
Signs And Symptions Of Overexposure: HEADACHE, DROWSINESS, DIZZINESS,
EXCITATION, EXCESS SALIVATION, VOMITING, UNCONSCIOUSNESS.
First Aid: SKIN: WASH W/SOAP & WATER. INHALATION: REMOVE TO FRESH AIR.
GIVE CPR/OXYGEN IF NEEDED. EYES: FLUSH W/WATER. OBTAIN MEDICAL
ATTENTION
IN ALL CASES. NOTE TO PHYSICIAN: NO SPECIFIC ANTIDOTE. PRODUCT IS I
NERT. TREATMENT OF OVEREXPOSSURE SHOULDBE DIRECTED AT CONTROL OF
SYMPTOMS & CLINICAL CONDITION.
==========
Handling and Disposal
==========
Spill Release Procedures: EVACUATE ALL PERSONNEL FROM AREA. WEAR SCBA
WHERE NEEDED. SAFELY SHUT OFF LEAK. VENTILATE AREA & MOVE LEAKING
ASSEMBLY TO WELL VENTILATED AREA. TEST AREA/CONFINED AREAS FOR
SUFFICIENT OXYGEN CONTENT P RIOR TO PERMITTING REENTRY TO AREA.
Waste Disposal Methods: SLOWLY RELEASE INTO ATMOSPHERE. DISPOSE OF ANY
PRODUCT/RESIDUE/DISPOSABLE CONTAINER/LINER IN AN ENVIRONMENTALLY
ACCEPTABLE MANNER IAW/FEDERAL, STATE & LOCAL REGULATIONS.
Handling And Storage Precautions: STORE & USE W/ADEQUATE VENTILATION.
CLOSE VALVE WHEN NOT IN USE & WHEN EMPTY.
Other Precautions: DON'T GROUND CYLINDER/ALLOW TO BECOME PART OF AN
ELECTRICAL CIRCUIT. DON'T STRIKE ARC ON CYLINDER. USE PIPING &
EQUIPMENT
ADEQUATELY DESIGNED TO WITHSTAND PRESSURES TO BE ENCOUNTERED. NEVER
WORK
ON A PRESSURIZED SYSTEM. (SEE SUPP)
==========
Fire and Explosion Hazard Information
==========
Extinguishing Media: USE MEDIA APPROPRIATE FOR SURROUNDING FIRE.
Fire Fighting Procedures: EVACUATE ALL PERSONNEL FROM DANGER AREA.
IMMEDIATELY DELUGE CONTAINERS W/WATER SPRAY FROM MAXIMUM DISTANCE
UNTIL
COOL, THEN SAFELY REMOVE CONTAINERS FROM AREA.
Unusual Fire/Explosion Hazard: CONTAINER MAY RUPTURE DUE TO HEAT OF
FIRE.
==========
Control Measures
==========
Respiratory Protection: WEAR AIR PURIFYING/AIR SUPPLIED RESPIRATOR
WHERE
LOCAL &/GENERAL EXHAUST VENTILATION ISN'T ADEQUATE TO KEEP WORKER
EXPOSURE BELOW APPLICABLE TLV'S DURING WELDING W/THIS PRODUCT. AIR
SUPPLIED RESPIRATO R REQUIRED IF WORKING IN CONFINED AREAS.
Ventilation: LOCAL/GENERAL EXHAUST TO MAINTAIN CONCENTRATION OF
HAZARDOUS
FUMES & GASES <APPLICABLE TLV'S IN WORKER'S BREATHING ZONE.
Protective Gloves: PREFERRED FOR CYLINDER HANDLING
Eye Protection: RECOMMENDED
Other Protective Equipment: METATARSAL SHOES FOR CYLINDER HANDLING
Supplemental Safety and Health: OTHER PRECAUTIONS CONT'D: IF THERE IS A
LEAK, CLOSE CYLINDER VALVE, BLOW DOWN SYSTEM BY VENTING TO A SAFE
PLACE,

THEN REPAIR LEAK. WHEN TWO/MORE GASES/LIQUEFIED GASES ARE MIXED, THEIR
HAZARDOUS PROPER TIES MAY COMBINE TO CREATE ADDITIONAL UNEXPECTED
HAZARDS. OBTAIN/EVALUATE SAFETY INFORMATION FOR EACH PRIOR TO MIXING.

==========
Physical/Chemical Properties
==========
B.P. Text: -452F
M.P/F.P Text: -457.6F
Vapor Pres: GAS
Vapor Density: 0.138
Spec Gravity: GAS
Solubility in Water: NEGLIGIBLE
Appearance and Odor: COLORLESS GAS AT NORMAL TEMP & PRESSURE W/NO ODOR.
Percent Volatiles by Volume: 100
==========
Reactivity Data
==========
Stability Indicator: YES
Stability Condition To Avoid: FIRE, TEMPS >125F, ARC
Hazardous Decomposition Products: NONE
Hazardous Polymerization Indicator: NO
==========
Toxicological Information
==========
==========
Ecological Information
==========
==========
MSDS Transport Information
==========
==========
Regulatory Information
==========
==========
Other Information
==========
==========
HAZCOM Label
==========
Product ID: HELIUM
Cage: 0LV01
Company Name: PRAXAIR, INC.
Street: 39 OLD RIDGEBURY RD
City: DANBURY CT
Zipcode: 06810-5113 US
Health Emergency Phone: 800-772-9247
Date Of Label Review: 12/16/1998
Label Date: 12/16/1998
Hazard And Precautions: INHALATION: ASPHYXIANT. CAN CAUSE RAPID
SUFFOCATION/DEATH DUE TO OXYGEN DEFICIENCY.
HEADACHE, DROWSINESS,
DIZZINESS, EXCI TATION, EXCESS SALIVATION, VOMITING, UNCONSCIOUSNESS.

==========
Disclaimer (provided with this information by the compiling agencies):
This information is formulated for use by elements of the Department of

Defense. The United States of America in no manner whatsoever expressly or implied warrants, states, or intends said information to have any application, use or viability by or to any person or persons outside the Department of Defense nor any person or persons contracting with any instrumentality of the United States of America and disclaims all liability for such use. Any person utilizing this instruction who is not a military or civilian employee of the United States of America should seek competent professional advice to verify and assume responsibility for the suitability of this information to their particular situation regardless of similarity to a corresponding Department of Defense or other government situation.

MACTEC

Job Hazard Analysis - HASP Format

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

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

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

MACTEC

Job Hazard Analysis - HASP Format

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

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

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.

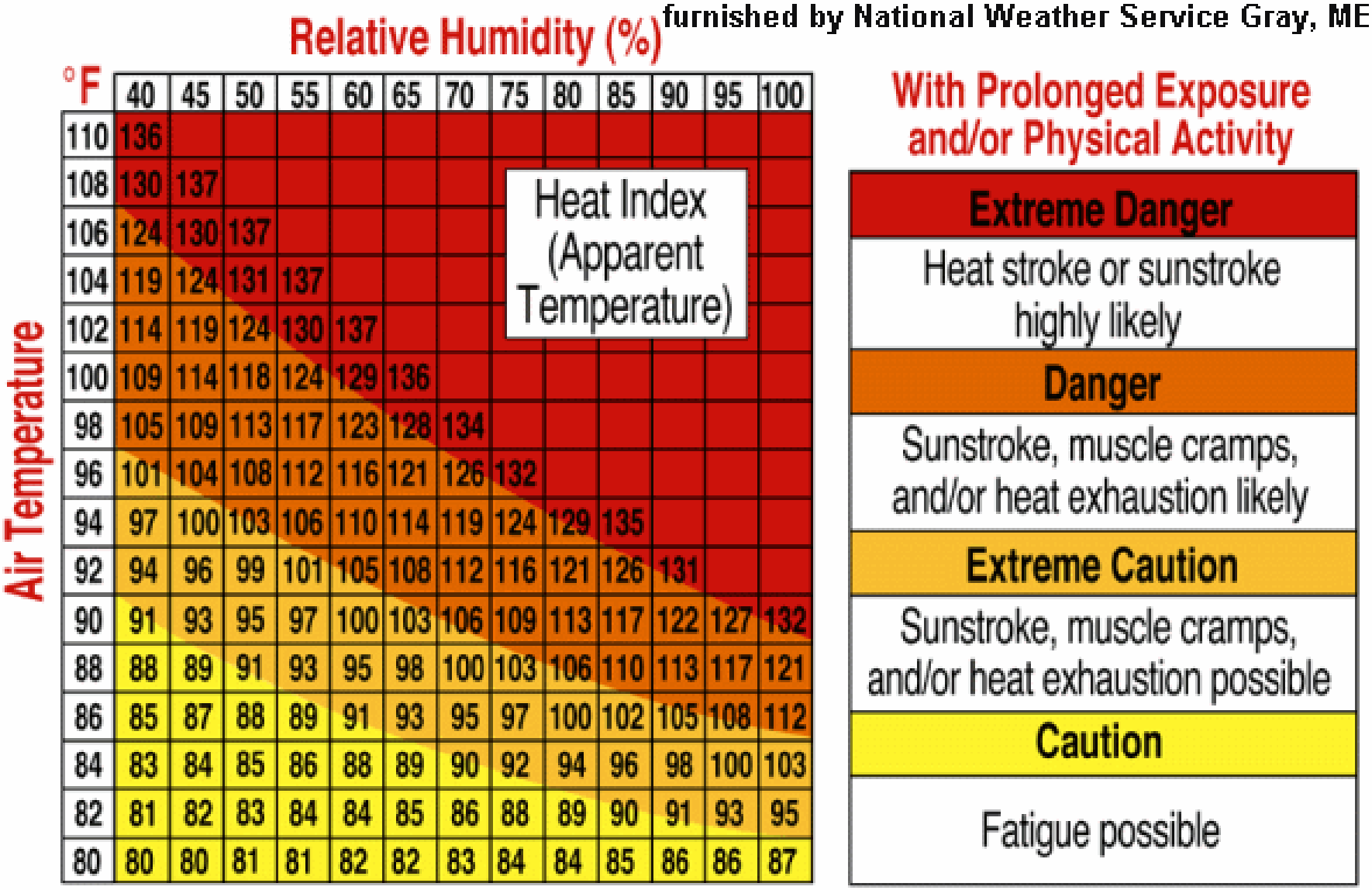
MACTEC

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: 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.

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

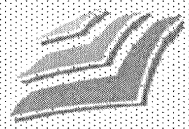
Job Title: Working with Preservatives (Acids) **Date of Analysis:** 5/30/06

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.

ATTACHMENT A

CONTAMINANT FACT SHEET



CONTAMINANT FACT SHEET

Chemical Name:
1,2-Dichloroethylene 156-59-2,
CAS Number: 540-59-0, 156-60-5
Synonyms:
Acetylene dichloride,
cis -Acetylene dichloride,
trans-Acetylene dichloride,

Color: Colorless

Physical State: Solid ___ Liquid X Gas ___

Odor: Chloroform-like

Odor Threshold: 0.08-17 ppm

Vapor Density: 3.35 g/L

Ionization Potential (IP): 9.65 eV

IDLH: 1000 ppm

HEALTH HAZARD DATA

Carcinogen: OSHA ___ IARC ___ NTP ___ ACGIH ___ NIOSH ___

Skin absorbable: yes ___ no X

Skin corrosive: yes ___ no X

Signs/Symptoms of Acute Exposure:
Irritant to eyes and respiratory system,
CNS, depression

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

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
PID	Microtip 10.6eV	Isobutylene 100 ppm	1.45	290

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

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits: Teflon, Viton, PE/EVAL, Barricade, CPF3, Tychem Responder

Gloves: Viton, Teflon, Polyvinyl Alcohol (do not use in water)

Boots: Teflon, Viton

Service Limit Concentration (ppm): 1000

MUC 1/2 Mask APR = TWA x 10 = 1000 ppm
MUC Full-Face APR = TWA x 10 = 1000 ppm

FIRE/REACTIVITY DATA

Flash Point: 36-39 ° F

LEL/UEL: 5.6% / 12.8%

Fire Extinguishing Media:

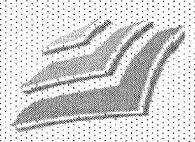
Dry Chemical	X	Foam	X
Water Spray	X	CO_2	X

Incompatibilities:
Strong oxidizers, strong alkalis, potassium hydroxide, copper

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

ATTACHMENT A

CONTAMINANT FACT SHEET



CONTAMINANT FACT SHEET

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

HEALTH HAZARD DATA

Color: colorless

Physical State: Solid ___ Liquid X Gas ___

Odor: chloroform-like

Odor Threshold: 120 ppm

Vapor Density: 4.0 g/L

Ionization Potential (IP): 11.06 eV

IDLH: 3000 ppm

Carcinogen: OSHA ___ IARC ___ NTP ___ ACGIH ___ NIOSH ___

Skin absorbable: yes __ no _X_

Skin corrosive: yes __ no _X_

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

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

AIR MONITORING

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

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

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits: Tychem

Gloves: Viton / Polyvinyl Alcohol / (do not use in water)

Boots: Viton

Service Limit Concentration (ppm): 1000

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

MUC Full-Face APR=TWA x 10= 500 ppm

FIRE/REACTIVITY DATA

Flash Point: 2°F

LEL/UEL: 5.4%/11.4%

Fire Extinguishing Media:

Dry Chemical X Foam X

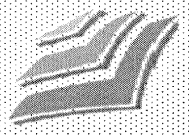
Water Spray ___ CO_2 X

Incompatibilities:
Strong oxidizers and strong caustics

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

ATTACHMENT A

CONTAMINANT FACT SHEET



CONTAMINANT FACT SHEET

Chemical Name:
Vinyl Chloride

CAS Number: 75-01-4

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

HEALTH HAZARD DATA

Color: Colorless

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

Odor: pleasant

Odor Threshold: 10-20 ppm

Vapor Density: 2.15 g/L

Ionization Potential (IP): 9.99 eV

IDLH: Not Determined

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

Skin absorbable: yes ___ no X

Skin corrosive: yes ___ no X

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

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

AIR MONITORING

Type	Brand/Model No.	Calibrations Method/Media	Relative Response or Conversion Factor	Meter Specific Action Level
PID	Microtip 10.6eV	Isobutylene 100 ppm	0.67	0.67
PID	HNu 10.2eV	Isobutylene 100 ppm	0.32	0.32
PID	HNu 11.7 eV	Isobutylene 100 ppm	0.78	0.78
Detector Tube	Drager 6728061	0.5 - 3 ppm		1.0 ppm

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

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits: Tychem, Teflon

Gloves: Teflon, Tychem; Nitrile Rubber

Boots: Nitrile Rubber, Teflon

Service Limit Concentration (ppm): 1000

MUC 1/2 Mask APR = TWA x 10 = 5 ppm

MUC Full-Face APR = TWA x 10 = 5 ppm

FIRE/REACTIVITY DATA

Flash Point: NA

LEL/UEL: 3.6% / 33%

Fire Extinguishing Media:

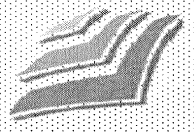
Dry Chemical	X	Foam	X
Water Spray	X	CO_2	X

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

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

ATTACHMENT A

CONTAMINANT FACT SHEET



CONTAMINANT FACT SHEET

Chemical Name:
Trichloroethene

CAS Number: 79-01-6

Synonyms:
Ethylene trichloride, TCE,
Trichloroethylene, Trilene

HEALTH HAZARD DATA

Color: Colorless

Physical State: Solid ___ Liquid X Gas ___

Odor: Chloroform-like

Odor Threshold: 82 ppm

Vapor Density: 4.5 g/L

Ionization Potential (IP): 9.45 eV

IDLH: 1000 ppm

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

Skin absorbable: yes ___ no X

Skin corrosive: yes ___ no X

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

Source	TWA (units)	STEL (units)	C (units)
OSHA PELs	100 ppm		200 ppm
ACGIH TLVs	50 ppm	100 ppm	
NIOSH RELs	25 ppm		

AIR MONITORING

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

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

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits: Viton, PE/EVAL, Tychem, Barricade, Trellchem, Teflon, Responder

Gloves: Viton, Teflon; Polyvinyl alcohol (do not use in water)

Boots: Teflon, Viton

Service Limit Concentration (ppm): 1000

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

MUC Full-Face APR = TWA x 10 = 250 ppm

FIRE/REACTIVITY DATA

Flash Point: Unknown

LEL/UEL: 8% / 10.5%

Fire Extinguishing Media:

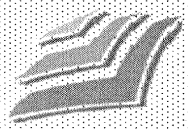
Dry Chemical	X	Alcohol resistant Foam	X
Water Spray	X	CO_2	X

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

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

ATTACHMENT A

CONTAMINANT FACT SHEET



CONTAMINANT FACT SHEET

Chemical Name: Tetrachloroethene

CAS Number: 127-18-4

Synonyms: tetrachloroethylene; Perchloroethylene (Perc)

HEALTH HAZARD DATA

Color: colorless

Physical State: Solid ___ Liquid X Gas ___

Odor: chloroform-like

Odor Threshold: 47 ppm

Vapor Density: 6.8 g/L

Ionization Potential (IP): 9.32 eV

IDLH: 150 ppm

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

Skin absorbable: yes __ no X

Skin corrosive: yes __ no X

Signs/Symptoms of Acute Exposure: Irritation of eyes, nose, and throat; nausea; flushing of the face and neck; vertigo; dizziness; incoherence; headache; sleepiness, and skin irritation

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

AIR MONITORING

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

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

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits: Teflon, Viton, CPF3, Barricade, Responder, Trellchem, Tychem

Gloves: Viton, Teflon, and Polyvinyl Alcohol (do not use in (water)

Boots: Nitrile Rubber

Service Limit Concentration (ppm): 1000

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

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

FIRE/REACTIVITY DATA

Flash Point: NA

LEL/UEL: NA / NA

Fire Extinguishing Media:

Dry Chemical X Foam X

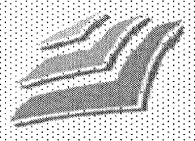
Water Spray X CO_2 X

Incompatibilities: Strong oxidizers, chemically-active metals, caustic soda, sodium hydroxide, and potash

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

ATTACHMENT A

CONTAMINANT FACT SHEET



CONTAMINANT FACT SHEET

Chemical Name:
1,1,1-Trichloroethane

CAS Number: 71-55-6

Synonyms:
Methyl chloroform; chlorothene

HEALTH HAZARD DATA

Color: Colorless

Physical State: Solid ___ Liquid X Gas ___

Odor: Chloroform-like

Odor Threshold: 100 ppm

Vapor Density: 5.5 g/L

Ionization Potential (IP): 11.00 eV

IDLH: 700 ppm

Carcinogen: OSHA ___ IARC ___ NTP ___ ACGIH ___ NIOSH ___

Skin absorbable: yes __ no X

Skin corrosive: yes X no ___

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

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

AIR MONITORING

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

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

PERSONAL PROTECTIVE EQUIPMENT

Recommended Protective Clothing Materials:

Suits: Tychem, Teflon, Viton

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

Boots: Teflon, Viton

Service Limit Concentration (ppm): NA

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

MUC Full-Face APR=TWA x 10= 700 ppm

FIRE/REACTIVITY DATA

Flash Point: NA

LEL/UEL: 7.5% / 12.5%

Fire Extinguishing Media:

Dry Chemical X Foam X

Water Spray ___ CO_2 X

Incompatibilities:
Strong caustics; strong oxidizers; chemically active metals such as: zinc, aluminum, magnesium powders, sodium, and potassium; water

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

PID ANALYZERS

hnu

Instrumentation for Environmental, Process & Industrial Hygiene Monitoring

Isobutylene in Air MSDS

Home

MATERIAL SAFETY DATA SHEET - CALIBRATION CHECK GAS/**ISOBUTYLENE** IN AIR

PRODUCT NAME: 100 PPM ISOBUTYLENE/AIR (**100 PPM ISOBUTYLENE**/AIR) **MSDS**
Version:4 Date: January, 2004

---

1. Chemical Product and Company Identification **PID ANALYZERS, LLC** 25 Walpole Park Drive South Walpole, MA 02081 TELEPHONE NUMBER: (508) 660-5001 **24-HOUR EMERGENCY NUMBER: 1-617-699-4307** FAX NUMBER: (508) 660-5040 E-MAIL: sales@hnu.com

PRODUCT NAME: ISOBUTYLENE (**100 PPM** – 0.9%) IN AIR
CHEMICAL NAME: Isobutylene in air

COMMON NAMES/ SYNONYMS: Calibration Gas

CLASSIFICATION: 2.2 WHIMIS CLASSIFICTATION: A, D2A, D2B

---

2. COMPOSITION/ INFORMATION ON INGREDIENTS
INGREDIENT %: **Isobutylene** 0.0001-0.9/Air 99-99.9999
VOLUME:17L
PEL-OSHA: N/A
TLV-ACGIH: N/A
LD50or LC50Route/Species:N/A
FORMULA: C4H8/Air 99.0

---

3. HAZARDS IDENTIFICATIONEMERGENCY OVERVIEW Release of this product may produce oxygen-deficient atmospheres (especially in confined spaces or other poorly ventilated environments); individuals in such atmospheres may be asphyxiated. **Isobutylene** may cause drowsiness and other central nervous system effects in high concentrations; however, due to the low concentration of this gas mixture, this is unlikely to occur.

ROUTE OF ENTRY:
Skin: No
Contact Skin: No
Absorption: No
Eye Contact: No
Inhalation: Yes
Ingestion:No

HEALTH EFFECTS:
Exposure Limits: Yes
Irritant: No
Sensitization: No
Reproductive Hazard: No
Mutagen: No
Carcinogenicity: No
NTP: No
IARC: No
OSHA: No

EYE EFFECTS: N/A.
SKIN EFFECTS: N/A.

MATERIAL SAFETY DATA SHEET - CALIBRATION CHECK GAS
PRODUCT NAME: **ISOBUTYLENE** (1 **PPM** – 0.9%) IN AIR
INGESTION EFFECTS: Ingestion unlikely. Gas at room temperature.
INHALATION EFFECTS: Due to the small size of this cylinder, no unusual health effects from over-exposure are anticipated under normal routine use.

NFPA HAZARD CODES HMIS HAZARD CODES RATING SYSTEM
Health: **1**
Flammability: **0**
Flammability: **0**
Reactivity: **0**

***0= No Hazard, 1= Slight Hazard, 2= Moderate Hazard, 3= Serious Hazard, 4= Severe Hazard**

---

4. FIRST AID MEASURES EYES: N/A

SKIN: N/A

INGESTION: Not required

INHALATION: PROMPT MEDICAL ATTENTION IS MANDATORY IN ALL CASED OF OVEREXPOSURE. RESCUE PERSONNEL SHOULD BE EQUIPPED THE SELF-CONTAINED BREATHING APPARATUS. Victims should be assisted to an uncontaminated area and inhale fresh air. Quick removal from the contaminated area is most important. If breathing has stopped administer artificial resuscitation and supplemental oxygen. Further treatment should be symptomatic and supportive.

---

5. FIRE-FIGHTING MEASURES These containers hold gas under pressure, with no liquid phase. If involved in a major fire, they should be sprayed with water to avoid pressure increases, otherwise pressures will rise and ultimately they may distort or burst to release the contents. The gases will not add significantly to the fire, but containers or fragments may be

projected considerable distances - thereby hampering fire fighting efforts.

---

6. ACCIDENTAL RELEASE MEASURES In terms of weight, these containers hold very little contents, such that any accidental release by puncturing etc. will be of no practical concern.

---

7. HANDLING AND STORAGE Suck back of water into the container must be prevented. Do not allow backfeed into the container. Use only properly specified equipment which is suitable for this product, its supply pressure and temperature. Use only in well-ventilated areas. Do not heat cylinder by any means to increase rate of product from the cylinder. Do not allow the temperature where cylinders are stored to exceed 130oF (54oC).

---

8. EXPOSURE CONTROLS/PERSONAL PROTECTION Use adequate ventilation for extended use of gas.

MATERIAL SAFETY DATA SHEET - CALIBRATION CHECK GAS PRODUCT NAME: ISOBUTYLENE (1 **PPM** – 0.9%) IN AIR

---

9. PHYSICAL AND CHEMICAL PROPERTIES PARAMETER: VALUE: Physical state : Gas Evaporation point : N/A pH : N/A Odor and appearance : Colorless, odorless gas

---

10. STABILITY AND REACTIVITY Stable under normal conditions. Expected shelf life 24 months.

---

11. TOXICOLOGICAL INFORMATION No toxicological damage caused by this product.

---

12. ECOLOGICAL INFORMATION No ecological damage caused by this product.

---

13. DISPOSAL INFORMATION Do not discharge into any place where its accumulation could be dangerous. Used containers are acceptable for disposal in the normal waste stream as long as the cylinder is empty and valve removed or cylinder wall is punctured.

---

14. TRANSPORT INFORMATION
United States DOT/Canada TDG PROPER SHIPPING NAME:
Compressed Gas N.O.S. Compressed Gas N.O.S. (**Isobutylene** in Air)
HAZARD CLASS: 2.2
IDENTIFICATION NUMBER: UN1956
SHIPPING LABEL: NONFLAMMABLE GAS

---

15. REGULATORY INFORMATION Isobutylene is listed under the accident prevention provisions of section 112(r) of the Clean Air Act (CAA) with a threshold quantity (TQ) of 10,000 pounds.

---

16. OTHER INFORMATION This **MSDS** has been prepared in accordance with the Chemicals

(Hazard Information and Packaging for Supply (Amendment) Regulation 1996. The information is based on the best knowledge of PID Analyzers, LLC , and its advisors and is given in good faith, but we cannot guarantee its accuracy, reliability or completeness and therefore disclaim any liability for loss or damage arising out of use of this data. Since conditions of use are outside the control of the Company and its advisors we disclaim any liability for loss or damage when the product is used for other purposes than it is intended.
MSDS/S010/248/January, 2004

Top

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

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

----- NOTICE-----

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

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

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

-----COMPONENTS AND CONTAMINANTS---

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

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

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

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

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

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

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

-----TOXICITY-----

potassium hydrogen phthalate:
Carcinogen status: none.
Local effects: irritant - inhalation, skin, eye.
Acute toxicity level: no data available.
Target effects: no data available.
medical conditions agravated by exposure: no data available.

-----HEALTH EFFECTS AND FIRST AID-----

INHALATION
POTASSIUM HYDROGEN PHTHALATE:IRRITANT.
ACUTE EXPOSURE - MAY CAUSE IRRITATION.
CHRONIC EXPOSURE - REPEATED OR PROLONGED EXPOSURE MAY CAUSE IRRITA-TION.

FIRST AID - REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, PERFORM ARTIFICIAL RESPIRATION. KEEP PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

POTASSIUM HYDROGEN PHTHALATE:IRRITANT.
ACUTE EXPOSURE - MAY CAUSE IRRITATION.
CHRONIC EXPOSURE - REPEATED OR PROLONGED EXPOSURE MAY CAUSE DERMATITIS.
FIRST AID - REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY, WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:

POTASSIUM HYDROGEN PHTHALATE: IRRITANT.
ACUTE EXPOSURE-DIRECT CONTACT MAY CAUSE IRRITATION, REDNESS AND PAIN.
CRONIC EXPOSURE-REPEATED OR PROLONGED EXPOSURE MAY CAUSE CONJUNCTIVITIS
FIRST AID - WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE, OCCASIONALLY LIFTING UPPER AND LOWER LIDS UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION

POTASSIUM HYDROGEN PHTHALATE: IRRITANT.
ACUTE EXPOSURE - MAY CAUSE NAUSEA, VOMITING AND DIARRHEA.
CRONIC EXPOSURE - NOT REPORTED TO OCCUR IN HUMANS
FIRST AID - IF VICTIM IS CONSCIOUS, IMMEDIATELY GIVE 2-4 GLASSES OF WATER, AND INDUCE VOMITING BY TOUCHING FINGER TO BACK OF THROAT, GET MEDICAL ATTENTION IMMEDIATELY.

-----REACTIVITY-----

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

-----STORAGE AND DISPOSAL-----

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

-----PROTECTIVE EQUIPMENT-----

When using, wear eye protection to prevent contact.