

Freedom Industries, Inc.

VRRP Interim Measures Work Plan

Etowah Terminal
Kanawha County
Charleston, West Virginia

April 22, 2015



A handwritten signature in blue ink that reads "Michael Lutz".

Michael Lutz
Project Scientist

A handwritten signature in blue ink that reads "Jason Manzo".

Jason Manzo
Certified Project Manager

A handwritten signature in blue ink that reads "Ira Buchanan".

Ira Buchanan
Licensed Remediation Specialist

VRRP Interim Measures Work Plan

Freedom Industries, Inc.
Etowah Terminal
Kanawha County
Charleston, West Virginia

Prepared for:
Freedom Industries

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Our Ref.:
OH003003.0003

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April 22, 2015

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- Figure 1 Proposed Storm Water Collection Trench Layout
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Appendices

- A Current Health & Safety Plan

ARCADIS U.S., Inc. (ARCADIS) prepared this *Interim Measures Work Plan* (IM Work Plan), on behalf of Freedom Industries, Inc. (Freedom) to describe additional measures required to cease the collection of stormwater runoff from the facility located at 1015 Barlow Drive, Charleston, Kanawha County, West Virginia (the Site; Figure 1). This IM Work Plan is based on information gathered during the spill response, sampling and remediation completed to date.

1. Facility Description

The Site was used for bulk storage of petroleum products from 1938 until 2001 when Etowah River Terminal, LLC purchased the Site from Pennzoil-Quaker State (PQS). Etowah River Terminal, LLC used the Site for storage of freeze conditioning agents.

PQS completed multiple environmental assessments from November 2000 to June 2004 to investigate and address petroleum compounds in the soil, groundwater, surface water and sediment. In September 2003, PQS entered the site into a Voluntary Remediation and Redevelopment Agreement under the West Virginia Voluntary Remediation and Redevelopment Rule. PQS completed environmental sampling and in October 2004, PQS completed a risk assessment. In December 2004, the WVDEP issued a Land Use Covenant for the Site. PQS submitted a Groundwater Monitoring Report to WVDEP in 2006 indicating no additional sampling was required at the Site and all monitoring wells should be properly abandoned. In their February 15, 2007 letter (Response to 2006 Groundwater Monitoring Report former Pennzoil-Quaker State Etowah Terminal, VRRP # 04506, Charleston, Kanawha County), WVDEP concurred with the conclusions of the 2006 Groundwater Monitoring Report.

On January 9, 2014 a tank (Tank 396) containing a blend of 85.5% MCHM, 7.3% PPH, and 4% water by weight failed and the contents were released to the ground surface and into the adjacent Elk River.

Investigation and delineation of possible soil and groundwater contamination is ongoing. All tanks at the Site have been drained, cleaned, dismantled and removed from the Site.

1.1 Chemicals of Potential Concern (COPCs)

The Site has been used for the storage and distribution of anti-freezing chemicals since 2001. Petroleum product storage and distribution ceased prior to the Site being awarded with an Environmental Covenant by the West Virginia Department of

Environmental Protection (WVDEP). As such, only chemicals stored after 2001 are identified as COPCs.

- 4-Methyl-1-cyclohexanemethonal (MCHM)
- Propylene glycol phenyl ether (PPH)
- Propylene Glycol and Glycols
- Alcohols
- Volatile fatty acids
- Aldehydes

2. Site Health and Safety Program

The current Health and Safety Plan (HASP) is provided for review in Appendix A. ARCADIS will review and update the HASP, as necessary.

2.1 Storm Water Collection Trench Installation

Following the January 2014 release, stormwater runoff has been collected in a trench (Figure 1), pumped to storage tanks (first permanent and then temporary) and disposed off site. Given the time of installation of the collection trench and the nature of installation, the trench itself is likely a minor secondary source of impacts to surface water. ARCADIS proposes covering the old trench with polyethylene sheeting and installing a new trench further downslope to collect stormwater runoff. The runoff will still be collected and disposed off site until an appropriate water sample can be collected demonstrating that stormwater runoff does not pose a risk to the Elk River. The location of the new storm water collection trench is shown on Figure 2. The purpose of the new storm water collection trench is to collect stormwater that has run across the release area prior to being discharged via sheet flow to the Elk River. Storm water that collects in the trench will be collected via a submersible pump in the trench and analyzed for MCHM and PPH. The collection system will consist of the following features:

- The storm water collection trench will be configured as shown in Figure 3;

- The bottom of the trench will be sloped toward the south to a collection sump and sampling location;
- The trench will be filled with gravel, and;
- A submersible pump will be placed in the sump on the southern end of the trench.

The interceptor trench will include a 40 mil linear low-density polyethylene (LLDPE) textured geomembrane along the proposed trench and to the east. The liner will be placed in such a manner to allow storm water flow from the slope to the trench.

2.2 Storm Water and Surface Water Sampling

One storm water sample will be collected from the trench and one surface water sample will be collected from the Elk River downgradient of the MCHM release. The samples will be analyzed for the COPCs. If COPCs are not detected, then ARCADIS will propose to cease the collection of stormwater from the site. In the event that concentrations are still detected, Freedom Industries will employ additional remedial efforts including, but not limited to, additional soil excavation along the spill pathway.

3. Initiation of Field Custody Procedure

3.1 Laboratory Scheduling

All sampling events to be conducted by ARCADIS will be scheduled with the TestAmerica to verify that the laboratory can accept the samples. TestAmerica will be notified at least one week prior to the sampling event and informed of the approximate number of samples to be collected, the parameters to be analyzed for and the anticipated date and time of sample arrival.

The following items will be checked prior to a sampling trip:

- Batteries of equipment to be used to verify that they are charged;
- Any sampling equipment scheduled for use will be verified clean and in good working order;
- Instrument calibration;

- Any backup systems to verify that they are in good working order; and,
- Sampling container supply to verify that an adequate supply of clean and appropriate sampling containers is available.

To insure the integrity of the cleaning process, preservation methods, sample transport, field blanks and trip blanks will be carried throughout all water sampling duration and shipment to the lab. The blanks will be preserved if applicable, on site before initial sample collection.

Field sampling kits will be prepared to insure that all items necessary to procure good, properly documented samples are available when needed. A standard sampling kit will contain the following items:

- Alconox soap
- A sufficient supply of distilled water for field blanks and decontamination
- Level D Personal Protective Equipment (PPE)
- Paper towels
- A waterproof pen and notepad
- Labels for sample identification
- A cooler with ice
- Chain-of-custody forms
- Trip blanks
- Sample bottles with extras
- Sample purge equipment, water quality meter and water level meter
- Standard tools

- Sample Packaging and Shipment

Following sample collection, the exterior containers will be decontaminated near the sampling location. Sample documentation and packaging will be performed in accordance with the procedure outlined in “A Compendium of Superfund Field Operations Methods” (United States Environmental Protection Agency [USEPA] 1987). Samples will be packaged for shipment as follows:

- A sample label will be attached to the sample bottle.
- A sample cooler will be used as a shipping container. In preparation for shipping samples, the drain plug will be taped shut from the outside and sufficient packing material will be placed in the bottom of the cooler.
- The bottles will be placed with capped opening facing up in the sample cooler.
- All samples will be placed on ice to reach a temperature of at least 4 degrees Celsius.
- The remainder of the cooler will be filled with sufficient packing material to prevent sample container damage during shipment.
- Chain-of-custody and any other necessary paperwork will be placed inside a plastic bag. The bag will be sealed and taped to the outside of the cooler lid. The air bill will be filled out before the samples are handed over to the carrier.
- The cooler will be closed and sealed with strapping tape.
- The cooler will be handed over to the overnight carrier, typically Federal Express. A standard air bill is necessary for shipping low concentration samples. If available, a laboratory-employed courier will retrieve the samples from the Site.

3.2 Decontamination Procedures

3.2.1 Personal Equipment

The sampler's hands will be protected from contact with the sample using nitrile gloves. New clean nitrile gloves will be worn to obtain each sample.

3.2.2 Sample Bottles

Sample bottles will be decontaminated in accordance with the USEPA document "Specifications and Guidance for Obtaining Contaminant-Free Sample Containers, April 1990".

3.2.3 Sampling Devices

All sampling devices, except for new disposable tubing, will be decontaminated as follows:

- Brush off visible dirt or mud with a brush and potable water;
- Scrub and wash with a biodegradable detergent in potable water – detergent water will be cycled through the pump using a tubing loop system;
- Distilled water rinse – rinse water will be cycled through the pump using a tubing loop system;
- In cases where heavy oils or petroleum products are present, the device will be sprayed with pesticide grade hexane, followed by isopropanol. This will be followed by a second rinse with distilled water;
- All decontamination water will be collected and containerized; and,
- The equipment will be wrapped or covered in plastic sheeting when not in use or during transport.

3.3 Sample Collection Procedures

3.3.1 Soil Sampling Procedures

- Shallow soil samples will be collected using a bucket-type stainless steel hand auger. Sample intervals will be from the ground-surface to a completion depth of one foot.
- All downhole equipment will be properly decontaminated prior to reuse.

3.3.2 Storm Water Sampling Procedures

- Storm water samples will be collected directly into sample containers from the tubing from the submersible pump located in the storm water collection trench.
- Surface water sampling from the Elk River will be completed utilizing a new 5-gallon bucket attached to a rope. Water from the bucket will be placed directly into sample containers.

3.3.3 Blank and Duplicate Sampling Procedures

The QC procedures to be performed for this project require the sampling and analysis of specific types of quality control samples, as described in this work plan. The following procedures will be used to obtain these samples:

- Trip blanks are samples of laboratory pure water, which accompanies sample containers to and from the sampling location and are shipped along with the samples to the laboratory for volatile organic compound (VOC) analysis. Trip blanks will be prepared by the laboratory and will be labeled and treated as separate samples. Trip blanks will be analyzed for VOCs and one will accompany every individual shipment of VOC samples.
- Field blanks (or equipment blanks) will be collected at a frequency of one for every 10 analytical samples. Field blanks will be treated as a separate, individual sample for labeling and chain-of-custody purposes. Field blanks are collected using contaminant-free distilled water as the sample medium. The distilled water will be allowed to contact the decontaminated sampling equipment; for example, pouring into the bailer used for sample collection and then placed into the appropriate containers for shipment and analysis. Field blanks will be obtained and analyzed for all parameters that are applicable to the samples being taken.
- Field duplicates will be collected at a frequency of one duplicate for every 10 analytical samples. Field duplicates are collected, identified, and analyzed as a separate analytical sample. Field duplicates are collected using the same methods as the analytical samples.

3.4 Sample Custody

The sample packaging and shipment procedures summarized below will ensure that the sample will arrive at the laboratory with the chain-of-custody intact.

3.4.1 Initiation of Chain-of-Custody Procedures

- The field sampler is personally responsible for the care and custody of the samples until they are transferred or properly dispatched. The number of people that handle the samples will be minimized at all times possible.
- All bottles will be tagged with sample numbers and locations.
- Sample labels will be completed for each sample using waterproof ink unless prohibited by weather conditions. For example, a logbook notation would explain that a pencil was used to fill out the sample tag because a pen would not function in freezing weather.
- The Project Manager will review all field activities to determine whether proper custody procedures were followed during the field work and decide if additional samples are required.

3.5 Field Logbooks / Documentation

A field logbook will be used to record data on sample collection activities performed. As such, entries will be described in as much detail as possible so that persons going to the site could reconstruct a particular situation without reliance on memory.

Field logbooks will be field survey books or notebooks. Logbooks will be assigned to field personnel, but will be stored in the document control center when not in use. Each logbook will be identified by the project-specific document number.

The title page of each logbook will contain the following:

- Person to whom the logbook is assigned,
- Logbook number,
- Project name,

- Project start date, and
- End date.

Entries into the logbook will contain a variety of information. At the beginning of each entry, the date, start time, weather, names of all sampling team members present, level of personal protection being used and the signature of the person making the entry will be entered. The names of visitors to the Site, field sampling or investigation team personnel and the purpose of their visit will also be recorded in the field logbook.

Measurements made and samples collected will be recorded. All entries will be made in ink and no erasures will be made. If an incorrect entry is made, the information will be crossed out with a single strike mark. Whenever a sample is collected, or a measurement is made, a detailed description of the location of the station will be recorded. The number of the photographs taken of the station, if any, will also be noted. All equipment used to make measurements will be identified, along with the date of calibration.

Samples will be collected following the sampling procedures described in this document. The equipment used to collect samples will be noted, along with the time of sampling, sample description, depth at which the sample was collected, and volume and number of containers. A sample identification number will be assigned prior to sample collection. Field duplicate samples, which will receive an entirely separate sample identification number, will be noted under sample description.

3.6 Transfer of Custody and Shipment Procedures

3.6.1 Completing the Chain-of-Custody

The sample numbers and locations will be listed on the chain-of-custody form. When transferring the possession of samples, the individuals relinquishing and receiving will sign, date and note the time on the chain-of-custody form. The chain-of-custody form documents the transfer of samples from the sampler to another person, to a mobile laboratory, to the permanent laboratory or to/from a secure storage area.

3.6.2 Packaging Samples for Shipment

Samples will be properly packaged for shipment and dispatched to TestAmerica for analysis, with a separate signed custody record enclosed in each sample box or

cooler. Shipping containers will be secured with strapping tape and custody seals for shipment to the laboratory. The preferred procedure includes use of a custody seal attached to the front right and back left of the cooler. The custody seals will be covered with clear plastic tape. The cooler will be sealed with strapping tape in at least two locations.

All shipments will be accompanied by the chain-of-custody record identifying the contents. The original record and the yellow copies will accompany the shipment and the pink copy will be retained by the sampler for filing at the sampling office.

If the samples are sent by common carrier, a bill of lading will be used. Receipts of bills of lading will be retained as part of the permanent documentation. If sent by mail, the package will be registered with return receipt requested. Commercial carriers are not required to sign off on the custody form as long as the custody forms are sealed inside the sample cooler and the custody seals remain intact.

The evidence files for analytical data are maintained at the ARCADIS office in Columbus, Ohio. The content of the evidence file will include all relevant records, reports, correspondence, logs, field logbooks, laboratory sample preparation and analysis logbooks, data package, pictures, subcontractor's reports, chain-of-custody records/forms, data review reports, etc. The evidence file will be under custody of the ARCADIS Project Manager.

3.7 Calibration Procedures and Frequency

Instruments and equipment used to gather, generate or measure environmental data will be calibrated with sufficient frequency and in such a manner that accuracy and reproducibility of results are consistent with the manufacturer's specifications.

Equipment to be used during the field sampling will be examined to certify that it is in proper operating condition. This includes checking the manufacturer's operating manual and the instructions for each instrument to verify that all maintenance requirements are being observed. Field notes from previous sampling trips will be reviewed so that the notations on any prior equipment have been carried out.

Calibration of field instruments is governed by the specific SOP for the applicable field analysis method and such procedures take precedence over the following general discussion.

Calibration of field instruments will be performed at the intervals specified by the manufacturer or more frequently as conditions dictate. Field instrumentation will include a photo ionization detector (PID) or flame ionization detector (FID). In the event that an internally calibrated field instrument fails to meet calibration/checkout procedures, it will be returned to the manufacturer for service.

4. Quality Control

Data quality objectives (DQOs) are qualitative and quantitative statements which specify the quality of the data required to support activities and are based on the end uses of the data to be collected. As such, different data uses may require different levels of data quality. There are five analytical levels, which address various data uses and the QA/QC effort and methods required to achieve the desired level of quality. These levels are:

- Screening (DQO Level 1): This provides the lowest data quality but the most rapid results. It is often used for health and safety monitoring, preliminary comparison to Applicable or Relevant and Appropriate Requirements, initial site characterization to locate areas for subsequent and more accurate analyses and for engineering screening of alternatives (Bench-scale tests). These types of data include those generated on-site through the use of PID/FID, pH, conductivity, and other real-time monitoring equipment at the site.
- Field Analyses (DQO Level 2): This provides rapid results that are typically individual organic or inorganic specific. This level may include mobile laboratory generated data depending on the level of quality control exercised.
- Engineering (DQO Level 3): This provides an intermediate level of data quality and is used for site characterization. Engineering analyses may include mobile laboratory generated data and most SW-846 analytical lab methods (e.g., laboratory data but without the highest level of quality control documentation).
- Conformational (DQO Level 4): This provides the highest level of data quality for standard methods. These analyses typically specify full Contract Laboratory Program analytical and an associated in-depth data validation procedure be employed in accordance with USEPA recognized protocol.
- Non-Standard (DQO Level 5): This refers to analyses by nonstandard protocols; for example, when achieving lower level detection limits or when analysis of an

unusual chemical compound is required. These analyses often require method development or adaptation. The level of quality control is usually similar to DQO Level 4 data.

Analytical data from the soil and water sampling event will be submitted to WVDEP which specifies the use of standard SW-846 methods in characterization sampling. This would correspond to DQO Level 4. The overall QA objective is to develop and implement procedures for field sampling, chain-of-custody, laboratory analysis, and reporting that will provide results that are legally defensible in a court of law. Specific procedures for sampling, chain-of-custody, laboratory instrument calibration, laboratory analysis, reporting of data, internal quality control, audits, preventative maintenance of field equipment, and corrective action are described in other sections of this Work Plan. The purpose of this section is to address the specific objectives in terms of accuracy, precision, completeness, representativeness and comparability.

4.1 Level of Quality Control

Field blank, trip blank, duplicate, and laboratory matrix samples will be analyzed to assess the quality of the data resulting from the field soil and water sampling program. Field and trip blanks, consisting of distilled water, will be submitted to the analytical laboratory to provide the means to assess the quality of the data resulting from the field sampling program. Field blank samples are analyzed to check for procedural contamination at the Site, which may cause sample contamination. Trip blanks are used to assess the potential for contamination of samples due to contaminant migration during sample shipment and storage. Duplicate samples are analyzed to check for sampling and analytical reproductivity.

The general level of the QC effort will be one field duplicate and one field blank for every 10 or fewer investigative samples. One VOC trip blank, consisting of distilled, deionized, and ultra pure water, will be included with each shipment of VOC samples.

The level of QC effort provided by the laboratory will be equivalent to the level of QC effort specified in the USEPA document SW-846 entitled "Test Methods for Evaluating Solid Waste, Physical/Chemical Methods".

4.2 Accuracy, Precision and Sensitivity of Analysis

The fundamental QA objective with respect to accuracy, precision, and sensitivity of the laboratory analytical data is to achieve the QC acceptance criteria of the analytical protocols.

4.3 Completeness, Representativeness and Comparability

4.3.1 Completeness

Completeness is a measure of the amount of valid data obtained from a measurement system compared to the amount that was expected to be obtained under normal conditions. It is expected that the laboratory will provide data meeting QC acceptance criteria for 95 percent or more for all samples tested. Following completion of the analytical testing, the percent completeness will be calculated by the following equation:

$$\text{Completeness(\%)} = \frac{(\text{number of valid data}) \times 100}{(\text{number of samples collected for each parameter analyzed})}$$

4.3.2 Representativeness

Representativeness expresses the degree to which data accurately and precisely represents a characteristic of a population, parameter variations at a sampling point, a process condition or an environmental condition. Representativeness is a qualitative parameter, which is dependent upon the proper design of the sampling program and proper laboratory protocol. The sampling network was designed to provide data representative of Site conditions. During development of this network, consideration was given to past waste disposal practices, existing analytical data, physical setting and processes. The rationale of the sampling network is discussed in detail in Section 4. Representativeness will be satisfied by insuring that this Work Plan is followed, proper sampling techniques are used, proper analytical procedures are followed and holding times of the samples are not exceeded in the laboratory. Representativeness will be assessed by the analysis of field duplicated samples.

4.3.3 Comparability

Comparability expresses the confidence with which one data set can be compared with another. The extent to which existing and planned analytical data will be comparable

depends on the similarity of sampling and analytical methods. The procedures used to obtain the planned analytical data, as documented in this Work Plan, are expected to provide comparable data. This new analytical data, however, may not be directly comparable to existing data because of difference in procedures and QA objectives.

4.4 Data Validation

According to WVDEP VRP guidelines, 10 percent of analytical data will be validated by a third-party. Standard protocols such as the USEPA Region 3 Modifications to the National Functional Guidelines for Evaluating Inorganic Analysis (April 1993) and USEPA Region 3 Modifications to the National Functional Guidelines for Evaluating Organic Data Review (November 1994) or USEPA Region 3's Innovative Approaches to Data Validation (June 1995) will be used for validation.

5. Project Organization

5.1 Freedom Industries Project Personnel

Project Manager – The project manager for Freedom is Mr. Mark Welch, Morris Anderson, Chief Restructuring Officer of Freedom. He is responsible for oversight of ARCADIS services and budgetary issues.

5.2 ARCADIS Personnel

Licensed Remediation Specialist (LRS) – The LRS established for this Site is Mr. Ira Buchanan. Mr. Buchanan will serve as overall supervisor for all activities conducted under the VRP.

ARCADIS Project Manager – Jason Manzo is the ARCADIS Project Manager. As project manager, Mr. Manzo, along with the LRS, will serve as the primary point of contact with WVDEP and will coordinate activities between local and state agencies to complete the remedial actions on the Site.

Field Team Leader – Mr. Todd Aebie and Mr. Jason Artrip will serve as field supervisors for all site activities.

Health and Safety Manager – The health and safety manager for ARCADIS will be Ms. Tricia Trommer. Ms. Trommer and/or her designee will coordinate all the safety related activities associated with the site investigation activities.

5.3 Laboratory Personnel

TestAmerica, Inc. will perform laboratory analyses. The following subsections identify key personnel and their responsibilities.

5.3.1 Laboratory Project Manager – Mr. Mark Loeb

- Ensures all resources of the laboratory are available on an as-requested basis;
- Reviews final analytical reports; and,
- Approves the laboratory Quality Assurance Plan (QAP).

5.3.2 Laboratory Operations Manager – Ms. Carolynne Roach

- Coordinates laboratory analyses;
- Supervises in-house chain-of-custody;
- Schedules sample analyses;
- Oversees data review;
- Oversees preparation of analytical reports; and,
- Approves final analytical reports prior to submission to ARCADIS.

5.3.3 Laboratory Quality Assurance Officer – Ms. Dee Sheppard

- Provides oversight of laboratory quality assurance;
- Provides oversight of Quality Assurance/Quality Control (QA/QC) documentation;
- Conducts detailed data review;
- Decides laboratory corrective actions, if required;
- Presents technical representation of laboratory QA procedures;

- Prepares laboratory Standard Operation Procedures; and,
- Approves the laboratory QAP.

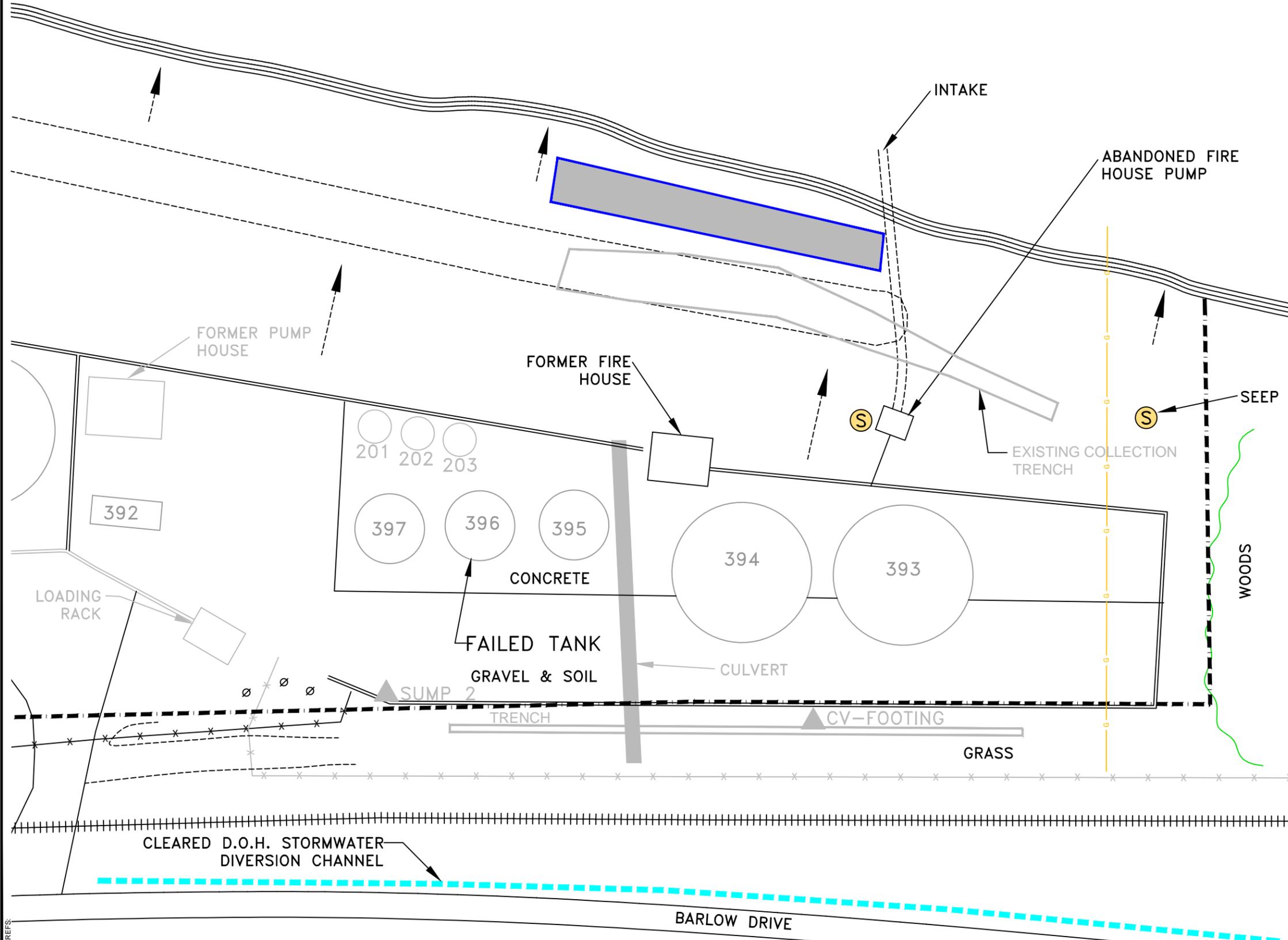
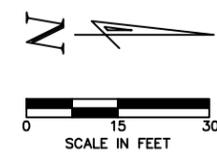
5.3.4 Laboratory Samples Custodian – Ms. Anne Maddux or her Designee

- Receives and inspect the incoming sample containers;
- Records the condition of the incoming sample containers;
- Signs appropriate documents;
- Verifies chain-of-custody and its correctness;
- Notifies laboratory manager and laboratory supervisor of sample receipt and inspection;
- Assigns a unique identification number and customer number and enter each into the sample receiving log;
- With the help of the laboratory manager, initiate transfer of the samples to appropriate laboratory sections; and,
- Controls and monitors access/storage of samples and extracts.

Primary responsibility for project quality rests with the ARCADIS Project Manager. Independent quality assurance will be provided by the Laboratory Project Manager and QA officer prior to the release of all data to ARCADIS.

Figures

CITY: Columbus, Oh DIV: GROUP: (M/D/V) DE: (R. Smith) LD: (Opt) PIC: (Opt) PM: (J. Marzoc) TM: (Opt) LVR: (Opt) ON: OFF: REF: G:\ENVCAD\Columbus-01\ACT\INDUSTRIES\0010003\1-32015-01.dwg LAYOUT: FIG 2 SMI TRENCH AREA. SAVED: 4/21/2015 9:59 AM ACADVER: 18.1S (LMS TECH) PLOTSETUP: --- PLOTSTYLETABLE: ACAD.CTB PLOTTED: 4/21/2015 11:47 AM BY: SMITH, BOB XREFS:



- LEGEND**
- Ⓢ SEEP
 - ▭ PROPOSED STORM WATER COLLECTION TRENCH
 - - - - - PROPERTY BOUNDARY
 - x - x - FENCE
 - + + + + + RAILROAD TRACKS
 - ▬ DIKE WALL
 - - - - - STEEP SLOPE
 - G — NATURAL GAS LINE
 - ∅ POLE

FREEDOM INDUSTRIES
 1015 BARLOW DRIVE, CHARLESTON, WEST VIRGINIA
 OH003003.0001

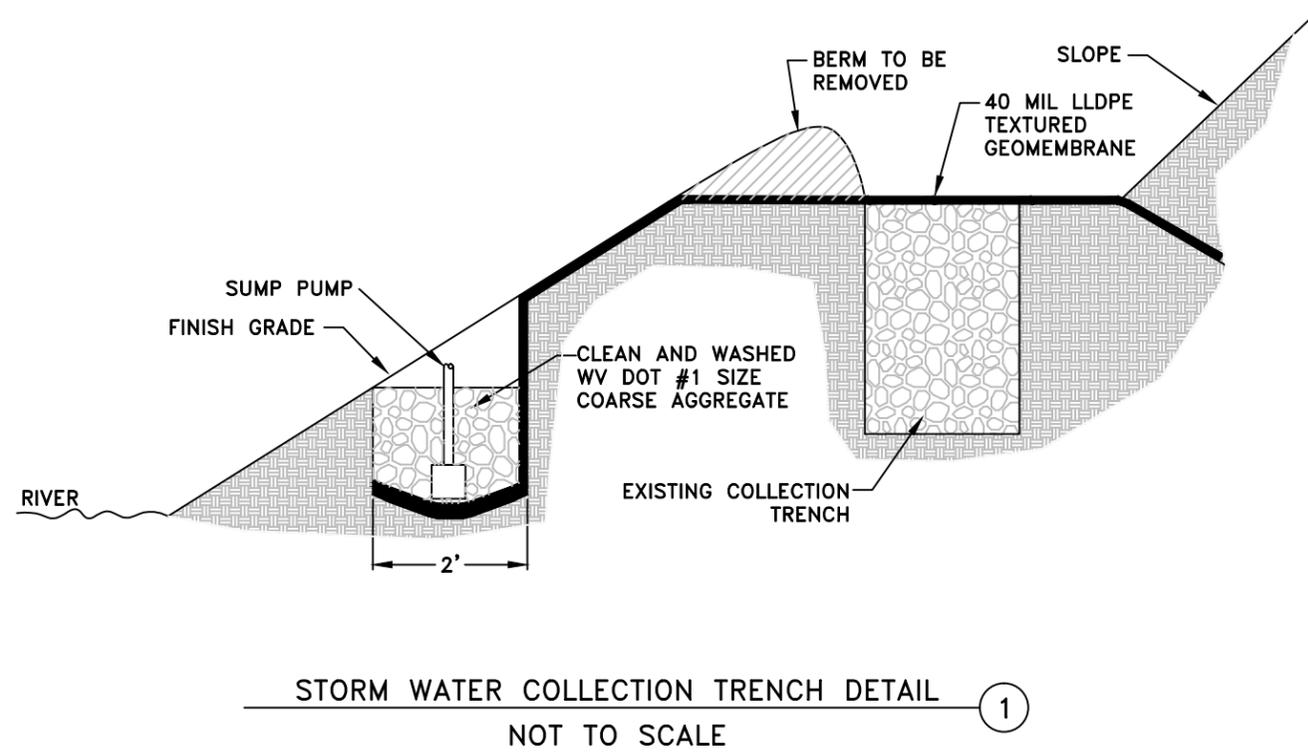
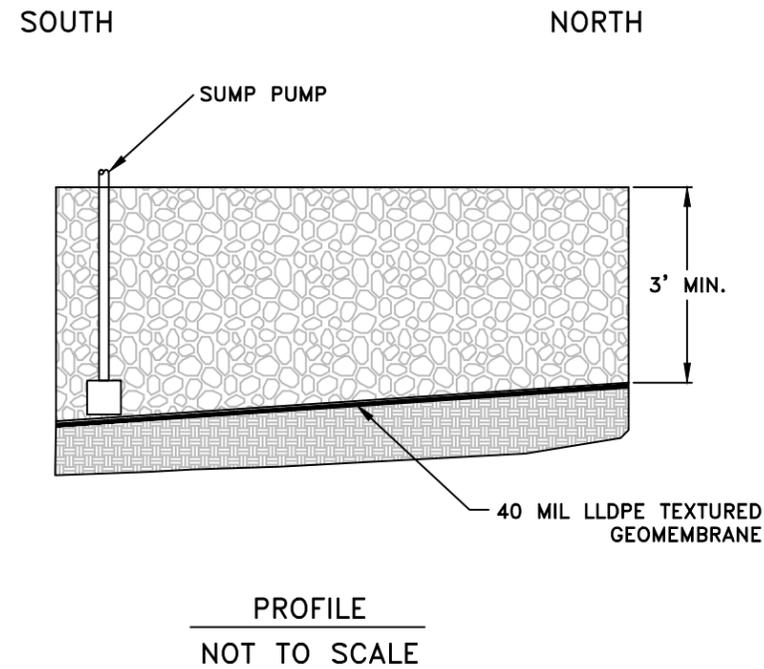
PROPOSED STORM WATER COLLECTION TRENCH LAYOUT

ARCADIS

FIGURE **1**

REFERENCE: DRAWING CREATED FROM SHAW ENVIRONMENTAL, INC. BASE MAP DATED 10/31/05.

CITY: (Columbus, Oh) DIV: (GROUP/IMP/MDV) DB: (B. Smith) LD: (Dpt) PIC: (Dpt) PM: (J. Menezes) TM: (Dpt) LVR: (CON+OFF+REF) XREFS:
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PLOT: 4/21/2015 11:53 AM ACADVER: 18.15 (LMS TECH) PAGES: 18.15 (LMS TECH) PAGES: 18.15 (LMS TECH) PAGES: 18.15 (LMS TECH) PAGES: 18.15 (LMS TECH)
PLOT: 4/21/2015 11:58 AM BY: SMITH, BOB



FREEDOM INDUSTRIES 1015 BARLOW DRIVE, CHARLESTON, WEST VIRGINIA OH003003.0001	
PROPOSED STORM WATER COLLECTION TRENCH DETAILS	
	FIGURE 2



Appendix A

Current Health & Safety Plan

Site Specific Health and Safety Plan

Revision 12 7/1/2014

Project Name: Freedom Industries
Charleston, West Virginia

Project Number: OH003003.0001
Client Name: Freedom Industries, Inc.
Date: 9/15/2014
HASP Expires 9/15/2015
Revision: 1

Approvals:

HASP Developer: Tricia Trommer

Project Manager: Jason Manzo

HASP Reviewer:
X Paget Davis

Emergency Information

Site Address: 1015 Barlow Drive
Charleston, West Virginia

Emergency Phone Numbers:

Emergency (fire, police, ambulance)	_____	911
Emergency (facility specific, if applicable):	_____	_____
_____	_____	NA
Emergency Other (specify) _____	_____	_____
Client Contact	Mark Welch	412-498-8258
WorkCare (non-lifethreatening injury/illness)	_____	1-800-455-6155
Project H&S	Tricia Trommer	614-985-9194
Task Manager	Todd Aebie	614-579-0007
Project Manager	Jason Manzo	614-985-9101
Corporate H&S Specialist	Andrew McDonald	410-200-3752
Corporate H&S Director	Denis Balcer	614-778-9171

Hospital Name and Address: Saint Francis Hospital (**Attachment 1**)

333 Laidley Street
Charleston, WV 25322

Hospital Phone Number: _____ 304-347-6500

Incident Notification Process

- 1 Dial 911/Facility Emergency Number/WorkCare as applicable
- 2 Contact PM/Supervisor _____ Jason Manzo
- 3 Contact Corporate H&S _____ Denis Balcer
- 4 Contact Client _____ Mark Welch

Complete below, as applicable, or clear cell contents:

Location of Assembly Area(s): _____ Administration Building and/or Entrance Gate

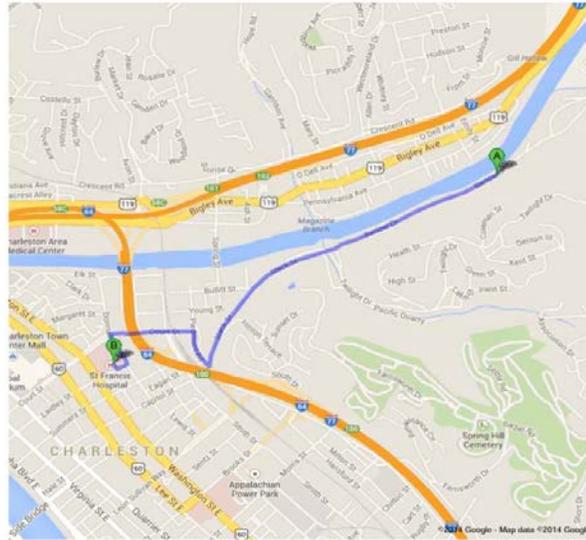
Nearest Storm Shelter: _____ Basement of Administration Building

Route to the Hospital

1015 Barlow Dr, Charleston, WV 25311 to Saint Francis Hospital 333 Laidley St Charles... Page 1 of 2



Directions to Saint Francis Hospital 333 Laidley St
St Charleston, WV 25322
1.5 mi – about 5 mins



https://maps.google.com/maps?f=d&source=s_d&saddr=1015+Barlow+Drive,+Charleston,+WV&daddr=333+Laidley+St,+Charleston,+WV 7/3/2014

Route to the Hospital

1015 Barlow Dr, Charleston, WV 25311 to Saint Francis Hospital 333 Laidley St Charles... Page 2 of 2

 1015 Barlow Dr, Charleston, WV 25311

- | | |
|---|--------------|
|  1. Head southwest on Barlow Dr toward Twilight Dr | go 0.5 mi |
| About 1 min | total 0.5 mi |
|  2. Continue onto Slack St | go 0.5 mi |
| About 2 mins | total 1.0 mi |
|  3. Turn right onto Piedmont Rd | go 0.1 mi |
| | total 1.2 mi |
|  4. Take the 1st left onto Court St | go 0.2 mi |
| About 40 secs | total 1.4 mi |
|  5. Turn left onto Donnally St | go 0.1 mi |
| | total 1.6 mi |
|  6. Take the 1st right onto Laidley St | go 164 ft |
| | total 1.5 mi |
|  7. Turn right | go 98 ft |
| Restricted usage road | total 1.5 mi |
| Destination will be on the left | |

 Saint Francis Hospital 333 Laidley St Charleston, WV 25322

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Map data ©2014 Google

Directions weren't right? Please find your route on maps.google.com and click "Report a problem" at the bottom left.

https://maps.google.com/maps?f=d&source=s_d&saddr=1015+Barlow+Drive,+Charleston,+WV 7/3/2014

General Information

Site Type (select all applicable where work will be conducted):

- | | |
|---|---|
| <input checked="" type="checkbox"/> Active | <input type="checkbox"/> Railroad |
| <input type="checkbox"/> Bridge | <input checked="" type="checkbox"/> Remote Area |
| <input checked="" type="checkbox"/> Buildings | <input type="checkbox"/> Residential |
| <input type="checkbox"/> Commercial | <input type="checkbox"/> Retail |
| <input checked="" type="checkbox"/> Construction | <input type="checkbox"/> Roadway (public, including right-of-way) |
| <input type="checkbox"/> Military Installation | <input type="checkbox"/> Water Treatment Plant |
| <input checked="" type="checkbox"/> Inactive Industrial | <input type="checkbox"/> Unknown |
| <input type="checkbox"/> Active Industrial | <input type="checkbox"/> Unsecured |
| <input type="checkbox"/> Landfill | <input type="checkbox"/> Utility |
| <input type="checkbox"/> Marine | <input checked="" type="checkbox"/> Other (specify): <u>Former Chemical Storage</u> |
| <input type="checkbox"/> Mining | |
| <input type="checkbox"/> Parking Lot/Private Roadway | |

If lone worker used on project, additional communication and emergency action planning for lone worker required.

Surrounding Area and Topography (select one):

- Surrounding area and topography are presented in the project work plan
- Surrounding area and topography (*briefly describe*):
Edge of Elk River on very steep hillside. Parts of site has been leveled with various fill material. Man-made retaining walls. Steep gravel roadways.

Simultaneous Operations (SimOps)

- Not applicable
- SimOps will exist on this project

Site Background (select one):

- Site background is presented in the project work plan
- Site background (*briefly describe*):
The Site is producer of specialty chemicals for the mining, steel, and cement industries. An AST at the site located along the Elk River failed in January 2014. The AST released approximately 10,000 gallons of Crude MCHM and PPH Glycol Ether into the Elk River, West Virginia.

Hazard Analysis

Risk Assessment Matrix		Likelihood Ratings** (likelihood that incident would occur)			
Consequences Ratings*		A	B	C	D
People	Property	0 Almost impossible	1 Possible but unlikely	2 Likely to happen	3 Almost certain to happen
1 - Slight or no health	Slight or no damage	0 - Low	1 - Low	2 - Low	3 - Low
2 - Minor health effect	Minor damage	0 - Low	2 - Low	4 - Medium	6 - Medium
3 - Major health effect	Local damage	0 - Low	3 - Low	6 - Medium	9 - High
4 - Fatalities	Major damage	0 - Low	4 - Medium	8 - High	12 - High

Division

All Categories

Business Unit

All Categories

Task 1: General Site Work/Site Walk

Hazardous Activity #1

Field-Biological - insects, spiders, snakes, etc

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological	M	Chemical	-	Driving	-	Electrical	-
Environmental	-	Gravity	-	Mechanical	-	Motion	-
Personal Safety	-	Pressure	-	Radiation	-	Sound	-

Overall Unmitigated Risk:

Medium

Mitigated Risk:

Medium if utilizing:

Controls that should be Considered:

Primary: TRACK Engineering Controls (specify below) Secondary: JSAs HASP Job Briefing/Site Awareness PPE (see HASP "PPE" section) Housekeeping

Enter Required Controls:

Hazardous Activity #2

Field-Ambient environment - exposure heat, cold, sun, weather, etc

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological	-	Chemical	-	Driving	M	Electrical	L
Environmental	L	Gravity	H	Mechanical	-	Motion	L
Personal Safety	M	Pressure	-	Radiation	-	Sound	-

Overall Unmitigated Risk:

Medium

Mitigated Risk:

Medium if utilizing:

Controls that should be Considered:

Primary: TRACK Field H&S Handbook Secondary: H&S Standards Engineering Controls (specify below) Admin. Controls (specify below) Specialized Equipment (specify below) PPE (see HASP "PPE" section)

Enter Required Controls:

Hazardous Activity #3

Field-Walking - uneven or slippery terrain

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological	-	Chemical	-	Driving	-	Electrical	-
Environmental	-	Gravity	M	Mechanical	-	Motion	-
Personal Safety	-	Pressure	-	Radiation	-	Sound	-

Overall Unmitigated Risk:

Medium

Mitigated Risk:

Medium if utilizing:

Controls that should be Considered:

Primary: TRACK Secondary: Housekeeping PPE (see HASP "PPE" section)

Enter Required Controls:

Hazardous Activity #4

Field-Inspections - facility audits

Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):

Biological	-	Chemical	-	Driving	M	Electrical	-
Environmental	-	Gravity	L	Mechanical	-	Motion	L
Personal Safety	L	Pressure	-	Radiation	-	Sound	-

Overall Unmitigated Risk:

Low

Mitigated Risk:

Low if utilizing:

Controls that should be Considered:

Primary: TRACK JSAs Engineering Controls (specify below) Secondary: Client Training/Briefing Job Briefing/Site Awareness PPE (see HASP "PPE" section)

Enter Required Controls:

Risk Assessment Matrix		Likelihood Ratings** (likelihood that incident would occur)			
Consequences Ratings*		A	B	C	D
People	Property	0 Almost impossible	1 Possible but unlikely	2 Likely to happen	3 Almost certain to happen
1 - Slight or no health	Slight or no damage	0 - Low	1 - Low	2 - Low	3 - Low
2 - Minor health effect	Minor damage	0 - Low	2 - Low	4 - Medium	6 - Medium
3 - Major health effect	Local damage	0 - Low	3 - Low	6 - Medium	9 - High
4 - Fatalities	Major damage	0 - Low	4 - Medium	8 - High	12 - High

Construction Oversight							
Task 2:							
Hazardous Activity #1							
Field-Demolition activities							
Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):							
Biological <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">-</td></tr></table>	-	Chemical <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">M</td></tr></table>	M	Driving <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">-</td></tr></table>	-	Electrical <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">H</td></tr></table>	H
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Overall Unmitigated Risk: Medium							
Mitigated Risk: Low if utilizing:							
Controls that should be Considered: Primary: TRACK 10 hr Construction Training Engineering Controls (specify below) JSAs Secondary: HASP H&S Standards Job Briefing/Site Awareness Cont/Emerg. Planning Admin. Controls (specify below) Specialized Equipment (specify below) Housekeeping Inspections							
Enter Required Controls:							
Hazardous Activity #2							
Field-Walking or working below elevated work or construction operations							
Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):							
Biological <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">-</td></tr></table>	-	Chemical <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">-</td></tr></table>	-	Driving <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">-</td></tr></table>	-	Electrical <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">-</td></tr></table>	-
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Overall Unmitigated Risk: High							
Mitigated Risk: Medium if utilizing:							
Controls that should be Considered: Primary: TRACK Engineering Controls (specify below) Secondary: JSAs H&S Standards Job Briefing/Site Awareness Admin. Controls (specify below) Inspections PPE (see HASP "PPE" section)							
Enter Required Controls:							
Hazardous Activity #3							
Field-Inspections and observations - general construction							
Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):							
Biological <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">-</td></tr></table>	-	Chemical <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">L</td></tr></table>	L	Driving <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">L</td></tr></table>	L	Electrical <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">M</td></tr></table>	M
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Overall Unmitigated Risk: Medium							
Mitigated Risk: Low if utilizing:							
Controls that should be Considered: Primary: TRACK JSAs Field H&S Handbook Engineering Controls (specify below) Secondary: H&S Standards Job Briefing/Site Awareness Cont/Emerg. Planning Admin. Controls (specify below) Specialized Equipment (specify below) Inspections PPE (see HASP "PPE" section)							
Enter Required Controls:							
Hazardous Activity #4							
General-Redundant tasks							
Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):							
Biological <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">-</td></tr></table>	-	Chemical <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">-</td></tr></table>	-	Driving <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">-</td></tr></table>	-	Electrical <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">-</td></tr></table>	-
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Overall Unmitigated Risk: Medium							
Mitigated Risk: Medium if utilizing:							
Controls that should be Considered: Primary: TRACK Job Rotation JSAs Job Briefing/Site Awareness Secondary: Inspections							
Enter Required Controls:							

Risk Assessment Matrix		Likelihood Ratings** (likelihood that incident would occur)			
Consequences Ratings		A	B	C	D
People	Property	0 Almost impossible	1 Possible but unlikely	2 Likely to happen	3 Almost certain to happen
1 - Slight or no health	Slight or no damage	0 - Low	1 - Low	2 - Low	3 - Low
2 - Minor health effect	Minor damage	0 - Low	2 - Low	4 - Medium	6 - Medium
3 - Major health effect	Local damage	0 - Low	3 - Low	6 - Medium	9 - High
4 - Fatalities	Major damage	0 - Low	4 - Medium	8 - High	12 - High

Task 3: Groundwater/Stormwater Sampling							
Hazardous Activity #1							
Field-Measurement - water levels and well sounding							
Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):							
Biological <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">-</td></tr></table>	-	Chemical <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">L</td></tr></table>	L	Driving <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">-</td></tr></table>	-	Electrical <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">-</td></tr></table>	-
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Overall Unmitigated Risk: Low							
Mitigated Risk: Low if utilizing:							
Controls that should be Considered: Primary: TRACK JSAs Secondary: Job Briefing/Site Awareness PPE (see HASP "PPE" section)							
Enter Required Controls:							
Hazardous Activity #2							
Field-Sampling - monitoring well sampling with electric, pneumatic or other non-manual pump							
Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):							
Biological <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">-</td></tr></table>	-	Chemical <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">L</td></tr></table>	L	Driving <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">-</td></tr></table>	-	Electrical <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">L</td></tr></table>	L
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Overall Unmitigated Risk: Low							
Mitigated Risk: Low if utilizing:							
Controls that should be Considered: Primary: TRACK JSAs Engineering Controls (specify below) Inspections Secondary: Job Briefing/Site Awareness PPE (see HASP "PPE" section)							
Enter Required Controls:							
Hazardous Activity #3							
Field-Surface water - working over or near water bodies							
Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):							
Biological <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">-</td></tr></table>	-	Chemical <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">-</td></tr></table>	-	Driving <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">L</td></tr></table>	L	Electrical <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">-</td></tr></table>	-
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Overall Unmitigated Risk: Low							
Mitigated Risk: Low if utilizing:							
Controls that should be Considered: Primary: TRACK Engineering Controls (specify below) JSAs Cont/Emerg. Planning PPE (see HASP "PPE" section) Secondary: Job Briefing/Site Awareness							
Enter Required Controls:							
Hazardous Activity #4							
Field-Tools, hand - use of hammers, screwdrivers, wrenches, etc							
Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):							
Biological <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">-</td></tr></table>	-	Chemical <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">-</td></tr></table>	-	Driving <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">-</td></tr></table>	-	Electrical <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">-</td></tr></table>	-
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Environmental <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">-</td></tr></table>	-	Gravity <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">L</td></tr></table>	L	Mechanical <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">-</td></tr></table>	-	Motion <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">M</td></tr></table>	M
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L							
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Personal Safety <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">-</td></tr></table>	-	Pressure <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">-</td></tr></table>	-	Radiation <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">-</td></tr></table>	-	Sound <table border="1" style="display: inline-table; vertical-align: middle;"><tr><td style="text-align: center;">-</td></tr></table>	-
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Overall Unmitigated Risk: Medium							
Mitigated Risk: Low if utilizing:							
Controls that should be Considered: Primary: TRACK JSAs Engineering Controls (specify below) Inspections Secondary: H&S Standards Job Briefing/Site Awareness Admin. Controls (specify below) Specialized Equipment (specify below) Site AwarenessPPE (see HASP "PPE" section)							
Enter Required Controls:							

Risk Assessment Matrix		Likelihood Ratings** (likelihood that incident would occur)			
Consequences Ratings*		A	B	C	D
People	Property	0 Almost impossible	1 Possible but unlikely	2 Likely to happen	3 Almost certain to happen
1 - Slight or no health	Slight or no damage	0 - Low	1 - Low	2 - Low	3 - Low
2 - Minor health effect	Minor damage	0 - Low	2 - Low	4 - Medium	6 - Medium
3 - Major health effect	Local damage	0 - Low	3 - Low	6 - Medium	9 - High
4 - Fatalities	Major damage	0 - Low	4 - Medium	8 - High	12 - High

Task 4: Soil Boring/Monitoring Well Installation							
Hazardous Activity #1							
Field-Drilling - Mechanical method (drill rig, DPT, etc)							
Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):							
Biological <table border="1"><tr><td>-</td></tr></table>	-	Chemical <table border="1"><tr><td>L</td></tr></table>	L	Driving <table border="1"><tr><td>-</td></tr></table>	-	Electrical <table border="1"><tr><td>M</td></tr></table>	M
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L							
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Environmental <table border="1"><tr><td>-</td></tr></table>	-	Gravity <table border="1"><tr><td>H</td></tr></table>	H	Mechanical <table border="1"><tr><td>H</td></tr></table>	H	Motion <table border="1"><tr><td>H</td></tr></table>	H
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H							
Personal Safety <table border="1"><tr><td>-</td></tr></table>	-	Pressure <table border="1"><tr><td>M</td></tr></table>	M	Radiation <table border="1"><tr><td>-</td></tr></table>	-	Sound <table border="1"><tr><td>H</td></tr></table>	H
-							
M							
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H							
Overall Unmitigated Risk: <table border="1"><tr><td>High</td></tr></table>	High	Mitigated Risk: <table border="1"><tr><td>Medium</td></tr></table> if utilizing:	Medium				
High							
Medium							
Controls that should be Considered:	Primary: TRACK Engineering Controls (specify below) Admin. Controls (specify below) JSAs Inspections Secondary: Job Briefing/Site Awareness H&S Standards Cont/Emerg. Planning PPE (see HASP "PPE" section)						
Enter Required Controls:							
Hazardous Activity #2							
Field-Excavation - soil removal, installation or removal piping, tanks or utilities, geologic investigations, etc							
Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):							
Biological <table border="1"><tr><td>-</td></tr></table>	-	Chemical <table border="1"><tr><td>-</td></tr></table>	-	Driving <table border="1"><tr><td>-</td></tr></table>	-	Electrical <table border="1"><tr><td>-</td></tr></table>	-
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Environmental <table border="1"><tr><td>-</td></tr></table>	-	Gravity <table border="1"><tr><td>H</td></tr></table>	H	Mechanical <table border="1"><tr><td>H</td></tr></table>	H	Motion <table border="1"><tr><td>H</td></tr></table>	H
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H							
Personal Safety <table border="1"><tr><td>-</td></tr></table>	-	Pressure <table border="1"><tr><td>-</td></tr></table>	-	Radiation <table border="1"><tr><td>-</td></tr></table>	-	Sound <table border="1"><tr><td>M</td></tr></table>	M
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M							
Overall Unmitigated Risk: <table border="1"><tr><td>High</td></tr></table>	High	Mitigated Risk: <table border="1"><tr><td>Medium</td></tr></table> if utilizing:	Medium				
High							
Medium							
Controls that should be Considered:	Primary: TRACK H&S Standards Excavation Awareness Training Excavation Competent Person Training (designated person) Engineering Controls (specify below) Secondary: JSAs HASP Job Briefing/Site Awareness Client Training/Briefing Cont/Emerg. Planning PPE (see HASP "PPE" section) Specialized Equipment (specify below) Housekeeping Inspections						
Enter Required Controls:							
Hazardous Activity #3							
Chemical-Toxic contaminants or chemicals - exposure to these materials							
Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):							
Biological <table border="1"><tr><td>-</td></tr></table>	-	Chemical <table border="1"><tr><td>M</td></tr></table>	M	Driving <table border="1"><tr><td>-</td></tr></table>	-	Electrical <table border="1"><tr><td>-</td></tr></table>	-
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Environmental <table border="1"><tr><td>M</td></tr></table>	M	Gravity <table border="1"><tr><td>-</td></tr></table>	-	Mechanical <table border="1"><tr><td>-</td></tr></table>	-	Motion <table border="1"><tr><td>-</td></tr></table>	-
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Personal Safety <table border="1"><tr><td>-</td></tr></table>	-	Pressure <table border="1"><tr><td>-</td></tr></table>	-	Radiation <table border="1"><tr><td>-</td></tr></table>	-	Sound <table border="1"><tr><td>-</td></tr></table>	-
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Overall Unmitigated Risk: <table border="1"><tr><td>Medium</td></tr></table>	Medium	Mitigated Risk: <table border="1"><tr><td>Low</td></tr></table> if utilizing:	Low				
Medium							
Low							
Controls that should be Considered:	Primary: TRACK JSAs Engineering Controls (specify below) Secondary: HASP Job Briefing/Site Awareness Hazcom Training MSDS/SDS (see also HASP Hazcom/GHS section) Admin. Controls (specify below) Specialized Equipment (specify below) Housekeeping PPE (see HASP "PPE" section)						
Enter Required Controls:							
Hazardous Activity #4							
Field-Security - high profile projects with irritated or upset public							
Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):							
Biological <table border="1"><tr><td>-</td></tr></table>	-	Chemical <table border="1"><tr><td>-</td></tr></table>	-	Driving <table border="1"><tr><td>-</td></tr></table>	-	Electrical <table border="1"><tr><td>-</td></tr></table>	-
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Environmental <table border="1"><tr><td>-</td></tr></table>	-	Gravity <table border="1"><tr><td>-</td></tr></table>	-	Mechanical <table border="1"><tr><td>-</td></tr></table>	-	Motion <table border="1"><tr><td>-</td></tr></table>	-
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Personal Safety <table border="1"><tr><td>M</td></tr></table>	M	Pressure <table border="1"><tr><td>-</td></tr></table>	-	Radiation <table border="1"><tr><td>-</td></tr></table>	-	Sound <table border="1"><tr><td>-</td></tr></table>	-
M							
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Overall Unmitigated Risk: <table border="1"><tr><td>Medium</td></tr></table>	Medium	Mitigated Risk: <table border="1"><tr><td>Low</td></tr></table> if utilizing:	Low				
Medium							
Low							
Controls that should be Considered:	Primary: TRACK JSAs Site Awareness Cont/Emerg. Planning Secondary: Job Briefing/Site Awareness						
Enter Required Controls:							

Risk Assessment Matrix		Likelihood Ratings** (likelihood that incident would occur)			
Consequences Ratings*		A	B	C	D
People	Property	0 Almost impossible	1 Possible but unlikely	2 Likely to happen	3 Almost certain to happen
1 - Slight or no health	Slight or no damage	0 - Low	1 - Low	2 - Low	3 - Low
2 - Minor health effect	Minor damage	0 - Low	2 - Low	4 - Medium	6 - Medium
3 - Major health effect	Local damage	0 - Low	3 - Low	6 - Medium	9 - High
4 - Fatalities	Major damage	0 - Low	4 - Medium	8 - High	12 - High

Task 5: Waste Management	
Hazardous Activity #1	
Chemical-Toxic contaminants or chemicals - exposure to these materials	
Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):	
Biological <input type="checkbox"/>	Chemical <input type="checkbox" value="M"/>
Environmental <input type="checkbox" value="M"/>	Gravity <input type="checkbox"/>
Personal Safety <input type="checkbox"/>	Pressure <input type="checkbox"/>
Driving <input type="checkbox"/>	Electrical <input type="checkbox"/>
Mechanical <input type="checkbox"/>	Motion <input type="checkbox"/>
Radiation <input type="checkbox"/>	Sound <input type="checkbox"/>
Overall Unmitigated Risk: Medium	Mitigated Risk: Low if utilizing:
Controls that should be Considered:	Primary: TRACK JSAs Engineering Controls (specify below) Secondary: HASP Job Briefing/Site Awareness Hazcom Training MSDS/SDS (see also HASP Hazcom/GHS section) Admin. Controls (specify below) Specialized Equipment (specify below) Housekeeping PPE (see HASP "PPE" section)
Enter Required Controls: <div style="background-color: yellow; height: 20px; width: 100%;"></div>	
Hazardous Activity #2	
General-Pinch points - moving parts from doors, closures, rotating devices, falling objects, well covers, manholes, etc	
Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):	
Biological <input type="checkbox"/>	Chemical <input type="checkbox"/>
Environmental <input type="checkbox"/>	Gravity <input type="checkbox" value="L"/>
Personal Safety <input type="checkbox"/>	Pressure <input type="checkbox" value="M"/>
Driving <input type="checkbox"/>	Electrical <input type="checkbox"/>
Mechanical <input type="checkbox"/>	Motion <input type="checkbox" value="M"/>
Radiation <input type="checkbox"/>	Sound <input type="checkbox"/>
Overall Unmitigated Risk: Low	Mitigated Risk: Low if utilizing:
Controls that should be Considered:	Primary: TRACK JSAs Engineering Controls (specify below) Secondary: Admin. Controls (specify below) Job Briefing/Site Awareness Inspections PPE (see HASP "PPE" section)
Enter Required Controls: <div style="background-color: yellow; height: 20px; width: 100%;"></div>	
Hazardous Activity #3	
Chemical-Hazardous materials - handling, non waste/IDW, non transportation	
Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):	
Biological <input type="checkbox"/>	Chemical <input type="checkbox" value="M"/>
Environmental <input type="checkbox" value="M"/>	Gravity <input type="checkbox"/>
Personal Safety <input type="checkbox"/>	Pressure <input type="checkbox"/>
Driving <input type="checkbox"/>	Electrical <input type="checkbox"/>
Mechanical <input type="checkbox"/>	Motion <input type="checkbox"/>
Radiation <input type="checkbox"/>	Sound <input type="checkbox"/>
Overall Unmitigated Risk: Medium	Mitigated Risk: Low if utilizing:
Controls that should be Considered:	Primary: TRACK Work Plan JSAs Engineering Controls (specify below) Secondary: Job Briefing/Site Awareness Hazcom Training Admin. Controls (specify below) Specialized Equipment (specify below) Housekeeping PPE (see HASP "PPE" section)
Enter Required Controls: <div style="background-color: yellow; height: 20px; width: 100%;"></div>	
Hazardous Activity #4	
General-Lifting of equipment or heavy materials by mechanical methods	
Hazard Types (unmitigated ranking H-High, M-Medium, L-Low):	
Biological <input type="checkbox"/>	Chemical <input type="checkbox"/>
Environmental <input type="checkbox"/>	Gravity <input type="checkbox"/>
Personal Safety <input type="checkbox" value="M"/>	Pressure <input type="checkbox"/>
Driving <input type="checkbox"/>	Electrical <input type="checkbox"/>
Mechanical <input type="checkbox"/>	Motion <input type="checkbox" value="M"/>
Radiation <input type="checkbox"/>	Sound <input type="checkbox"/>
Overall Unmitigated Risk: Medium	Mitigated Risk: Medium if utilizing:
Controls that should be Considered:	Primary: TRACK Specialized Training per Standard Secondary: JSAs Job Briefing/Site Awareness Specialized Equipment (specify below) Admin. Controls (specify below) Engineering Controls (specify below)
Enter Required Controls: <div style="background-color: yellow; height: 20px; width: 100%;"></div>	

Hazard Communication (HazCom)/Global Harmonization System (GHS)

HAZCOM/GHS for this project is managed by the client or general contractor

List the chemicals anticipated to be used by **ARCADIS** on this project per HazCom/GHS requirements.
(Modify quantities as needed)

Acids/Bases	Qty	Decontamination	Qty	Calibration	Qty.
<input type="checkbox"/> Not applicable		<input type="checkbox"/> Not applicable		<input type="checkbox"/> Not applicable	
<input checked="" type="checkbox"/> Hydrochloric acid	<500 ml	<input checked="" type="checkbox"/> Alconox	≤ 5 lbs	<input checked="" type="checkbox"/> Isobutylene/air	1 cyl
<input checked="" type="checkbox"/> Nitric acid	<500 ml	<input type="checkbox"/> Liquinox	≤ 1 gal	<input type="checkbox"/> Methane/air	1 cyl
<input checked="" type="checkbox"/> Sulfuric acid	<500 ml	<input type="checkbox"/> Acetone	≤ 1 gal	<input type="checkbox"/> Pentane/air	1 cyl
<input type="checkbox"/> Sodium hydroxide	<500 ml	<input type="checkbox"/> Methanol	≤ 1 gal	<input type="checkbox"/> Hydrogen/air	1 cyl
<input type="checkbox"/> Zinc acetate	<500 ml	<input type="checkbox"/> Hexane	≤ 1 gal	<input type="checkbox"/> Propane/air	1 cyl
<input type="checkbox"/> Ascorbic acid	<500 ml	<input type="checkbox"/> Isopropyl alcohol	≤ 4 gal	<input type="checkbox"/> Hydrogen sulfide/air	1 cyl
<input type="checkbox"/> Acetic acid	<500 ml	<input type="checkbox"/> Nitric acid	≤ 1 L	<input type="checkbox"/> Carbon monoxide/air	1 cyl
<input type="checkbox"/> Other:		<input type="checkbox"/> Other:		<input checked="" type="checkbox"/> pH standards (4,7,10)	≤ 1 gal
_____		_____		<input type="checkbox"/> Conductivity standards	≤ 1 gal
_____		_____		<input type="checkbox"/> Other:	
_____		_____		_____	

Fuels	Qty.	Kits	Qty.
<input checked="" type="checkbox"/> Not applicable		<input checked="" type="checkbox"/> Not applicable	
<input type="checkbox"/> Gasoline	≤ 5 gal	<input type="checkbox"/> Hach (specify):	_____ 1 kit
<input type="checkbox"/> Diesel	≤ 5 gal	<input type="checkbox"/> DTECH (specify):	_____ 1 kit
<input type="checkbox"/> Kerosene	≤ 5 gal	<input type="checkbox"/> EPA 5035 Soil (specify kit):	_____ 1 kit
<input type="checkbox"/> Propane	1 cyl	<input type="checkbox"/> Other:	_____
<input type="checkbox"/> Other:		_____	_____
_____		_____	_____

Remediation	Qty.	Other:	Qty.
<input checked="" type="checkbox"/> Not applicable		<input checked="" type="checkbox"/> Not applicable	
<input type="checkbox"/> _____		<input type="checkbox"/> Spray paint	≤ 6 cans
<input type="checkbox"/> _____		<input type="checkbox"/> WD-40	≤ 1 can
<input type="checkbox"/> _____		<input type="checkbox"/> Pipe cement	≤ 1 can
<input type="checkbox"/> _____		<input type="checkbox"/> Pipe primer	≤ 1 can
<input type="checkbox"/> _____		<input type="checkbox"/> Mineral spirits	≤ 1 gal
<input type="checkbox"/> _____		_____	_____

Material safety data sheets (MSDSs)/Safety Data Sheets (SDSs) must be available to field staff.
Indicate below how MSDS information will be provided:

<input type="checkbox"/> Not applicable	<input type="checkbox"/> Contractor MSDSs/SDSs are not applicable
<input type="checkbox"/> Printed copy in company vehicle	<input type="checkbox"/> Contractor MSDSs/SDSs are attached
<input type="checkbox"/> Printed copy in the project trailer/office	<input checked="" type="checkbox"/> Contractor MSDSs/SDSs will be on site and located:
<input checked="" type="checkbox"/> Printed copy attached (Attachment 3)	_____
<input type="checkbox"/> Electronic copy on field computer	To Be Determined (TBD).
<input type="checkbox"/> Bulk quantities of the following materials will be stored:	_____

Contact the project H&S contact for information in determining code and regulatory requirements associated with bulk storage of materials.

Monitoring

Chemical air monitoring is not required for this project.

For projects requiring air monitoring, list the relevant constituents representing a hazard to site workers.

Constituent	Max. Conc.	Units	TWA		STEL		IDLH		LEL/UEL		VD	VP	IP
			Units	Units	Units	Units	(%)	Air=1	(mm Hg)	(eV)			
Benzene	10	ppm	0.5	p	2.5	p	500	p,N	1.2/7.8	0	NA	75	9.24
None			9999	-	0	-	0	-	0	0	0	0	0
None			9999	-	0	-	0	-	0	0	0	0	0
None			9999	-	0	-	0	-	0	0	0	0	0
None			9999	-	0	-	0	-	0	0	0	0	0
None			9999	-	0	-	0	-	0	0	0	0	0

Notes: TWAs are ACGIH 8 hr-TLVs unless noted.

p-ppm m-mg/m³
s- skin c-ceiling c2- ceiling (2 hr) se-sensitizer "#N/A" -Constituent is not in database, manually enter information
r- respirable i-inhalable "9999" - NA O-OSHA PEL N-NIOSH 10 hr REL

Monitoring Equipment and General Protocols

Air monitoring is required for any task or activity where employees have potential exposure to vapors or particulates above the TWA. Action levels below are appropriate for most situations. Contact the project H&S contact for all stop work situations. Select monitoring frequency and instruments to be used.

Monitoring Frequency:	Continuously
Indicator Tube/Chip Frequency:	Indicator tube/chip monitoring not required

Instrument	Action Levels	Actions
<input checked="" type="checkbox"/> Photoionization Detector Lamp (eV): 10.6	< 12.000 12.000 - 25.000 > 25.000	Continue work Sustained >5 min. continuous monitor, review eng. controls and PPE, proceed with caution Sustained >5 min. stop work, contact SSO
<input type="checkbox"/> Flame Ionization Detector (FID)	< 0.0 0.0 - 0.0 > 0.0	Continue work Sustained >5 min. continuous monitor, review eng. controls and PPE, use caution Sustained >5 min. stop work, contact SSO
<input type="checkbox"/> LEL/O2 Meter <input type="checkbox"/> <input type="checkbox"/>	0-5% LEL >5-10% LEL >10% LEL 19.5%-23.5% O2 <19.5% O2 >23.5% O2	Continue work Continuous monitor, review eng. controls, proceed with caution Stop work, evacuate, contact SSO Normal, continue work O2 deficient, stop work, evacuate, cont. SSO O2 enriched, stop work, evacuate, contact SSO
<input type="checkbox"/> Indicator: tube chip Compound(s):	≤PEL/TLV >PEL/TLV	Continue work Stop work, review eng. controls and PPE, contact SSO
<input checked="" type="checkbox"/> Particulate Monitor (mists, aerosols, dusts in mg/m ³)	< 2.5 2.5 - 5.000 > 5.000	Continue work Use engineering controls, monitor continuously Stop work, review controls, contact SSO
<input type="checkbox"/> Other:	Specify:	Specify:

Staff will be familiarized with the licorice type odor before beginning work. The material is an irritant that could cause itching or burning of eyes, skin, and respiratory tract. In some cases it could cause prompt vomiting or diarrhea.

Three particulate monitors will run continuously. Data will be recorded (real-time readings) every hour for the first day or two and then scale back if there are no problems. The log sheet will indicate where the monitors were positioned daily. 1 upwind, and 2 downwind of the active demolition area. Daily record of the daily zero calibration will be recorded on the log sheet.

MCHM is not easily detectable in air with readily available equipment and does not present an immediate health hazard at low concentrations, the compound will be evaluated through olfactory (odor) methods. If the odor because significant enough to cause worker discomfort, work will be temporarily discontinued and odor

Personal Protective Equipment (PPE)

See JSA or Permit for the task being performed for required PPE. If work is not conducted under a JSA or Permit, refer to the governing document for PPE requirements. At a minimum, the following checked PPE is required for all tasks during field work (outside of field office trailers and vehicles) not covered by a JSA or Permit on this project:

Minimum PPE required to be worn by all staff on project: Specify Type:

<input checked="" type="checkbox"/> Hard hat	<input type="checkbox"/> Snake chaps/guards	<input type="checkbox"/> Coveralls:	_____
<input checked="" type="checkbox"/> Safety glasses	<input type="checkbox"/> Briar chaps	<input type="checkbox"/> Apron:	_____
<input type="checkbox"/> Safety goggles	<input type="checkbox"/> Chainsaw chaps	<input checked="" type="checkbox"/> Chem. resistant gloves:	<u>nitrile</u>
<input type="checkbox"/> Face shield	<input type="checkbox"/> Sturdy boot	<input type="checkbox"/> Gloves other:	_____
<input type="checkbox"/> Hearing protection	<input checked="" type="checkbox"/> Steel or comp. toe boot	<input checked="" type="checkbox"/> Chemical boot:	<u>rubber - as needed</u>
<input type="checkbox"/> Rain suit	<input type="checkbox"/> Metatarsal boot	<input type="checkbox"/> Boot other:	_____
<input type="checkbox"/> Other:	_____	<input checked="" type="checkbox"/> Traffic vest, shirt or coat:	<u>Class II</u>
		<input type="checkbox"/> Life vest:	_____

Task specific PPE:

Comments:

Medical Surveillance (check all that apply)

- Medical Surveillance is not required for this project.
- HAZWOPER medical surveillance applies to all ARCADIS site workers on the project.
- HAZWOPER medical surveillance applies to all subcontractors on the project.
- HAZWOPER medical surveillance applies to all site workers on the project except:

- Other medical surveillance required (describe type and who is required to participate):

- Client drug and/or alcohol testing required.

Hazardous Materials Shipping and Transportation (check all that apply)

- Not applicable, no materials requiring a Shipping Determination (SD) will be transported or shipped
- A SD has been reviewed and provided to field staff
- A SD is attached **(Attachment 5)**
- All HazMat will be transported under Materials of Trade by ARCADIS (see generic MOT SD Form)
- Other (specify):

Roadway Work Zone Safety (check all that apply)

- Not applicable for this project
- All or portions of the work conducted under a TCP
- All or portions of the work conducted under a STAR Plan
- TCP or STAR Plan provided to field staff
- TCP or STAR Plan attached
- Other (specify):

ARCADIS Commercial Motor Vehicles (CMVs)

This section is applicable to ARCADIS operated vehicles only

- This project will **not** utilize CMV drivers
- This project will utilize CMV drivers

Site Control (check all that apply)

- Not applicable for this project.
- Site control protocols are addressed in JSA or other supporting document (attach)
- Maintain an exclusion zone of 15 ft. around the active work area
- Site control is integrated into the STAR Plan or TCP for the project
- Level C site control - refer to Level C Supplement attached
- Other (specify):

Decontamination (check all that apply)

- Not applicable for this project.
- Decontamination protocols are addressed in JSA or other governing document (attach)
- Level D work- wash hands and face prior to consuming food, drink or tobacco.
- Level D Modified work- remove coveralls and contain, wash hands and face prior to consuming food, drink or tobacco. Ensure footwear is clean of site contaminants
- Level C work - refer to the Level C supplement attached.
- Other (specify):

Sanitation (check all that apply)

- Mobile operation with access to off-site restrooms and potable water
- Restroom facilities on site provided by client or other contractor
- Project to provide portable toilets (1 per 20 workers)
- Potable water available on site
- Project to provide potable water (assume 1 gal./person/day)
- Project requires running water (hot and cold, or tepid) with soap and paper towels

Safety Briefings (check all that apply)

- Safety briefing required daily
- Safety briefing required twice a day
- Safety briefings required at the following frequency: _____
- Subcontractors to participate in ARCADIS safety briefings
- ARCADIS to participate in client/contractor safety briefings
- Other (specify):

HASP Forms are provided in Attachment 4.

Safety Equipment and Supplies

Safety equipment/supply requirements are addressed in the JSA or Permit for the task being performed. If work is not performed under a JSA or Permit, the following safety equipment is required to be present on site in good condition (Check all that apply):

- | | |
|---|---|
| <input checked="" type="checkbox"/> First aid kit | <input type="checkbox"/> Insect repellent |
| <input type="checkbox"/> Bloodborne pathogens kit | <input checked="" type="checkbox"/> Sunscreen |
| <input checked="" type="checkbox"/> Fire extinguisher | <input type="checkbox"/> Air horn |
| <input type="checkbox"/> Eyewash (ANSI compliant) | <input type="checkbox"/> Traffic cones |
| <input checked="" type="checkbox"/> Eyewash (bottle) | <input type="checkbox"/> 2-way radios |
| <input checked="" type="checkbox"/> Drinking water | <input type="checkbox"/> Heat stress monitor |
| <input type="checkbox"/> Other: _____ | _____ |

Behavior Based Safety Program (check all that apply)

- TIP required at the following frequency on this project:
Select One: 40 mhrs 1 time(s) _____ Define: _____
- H&S Field Assessment required at the following frequency on this project:
Select One: _____ mhrs _____ time(s) _____ Define: _____
- Other (specify): _____

List tasks anticipated for TIP activity:

Near miss reporting enhances our H&S program. Take the time to enter near misses into 4-Sight.

Signatures

I have read, understand and agree to abide by the requirements presented in this health and safety plan. I understand that I have the absolute right to stop work if I recognize an unsafe condition affecting my work until corrected.

Printed Name	Signature	Date
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____
_____	_____	_____

- Add additional sheets if necessary
- Subcontractor Acknowledgement Form attached

You have an absolute right to STOP WORK if unsafe conditions exist!

Attachment 1

Hospital

 1015 Barlow Dr, Charleston, WV 25311

- | | | |
|---|--|---------------------------|
| 1. | Head southwest on Barlow Dr toward Twilight Dr
About 1 min | go 0.5 mi
total 0.5 mi |
| 2. | Continue onto Slack St
About 2 mins | go 0.5 mi
total 1.0 mi |
|  | 3. Turn right onto Piedmont Rd | go 0.1 mi
total 1.2 mi |
|  | 4. Take the 1st left onto Court St
About 46 secs | go 0.2 mi
total 1.4 mi |
|  | 5. Turn left onto Donnally St | go 0.1 mi
total 1.5 mi |
|  | 6. Take the 1st right onto Laidley St | go 164 ft
total 1.5 mi |
|  | 7. Turn right
Restricted usage road
Destination will be on the left | go 98 ft
total 1.5 mi |

 Saint Francis Hospital 333 Laidley St Charleston, WV 25322

These directions are for planning purposes only. You may find that construction projects, traffic, weather, or other events may cause conditions to differ from the map results, and you should plan your route accordingly. You must obey all signs or notices regarding your route.

Map data ©2014 Google

Directions weren't right? Please find your route on maps.google.com and click "Report a problem" at the bottom left.

Attachment 2

JSA's

Job Safety Analysis

General

JSA ID	10802	Status	(3) Completed
Job Name	Construction-Oversight - excavation and	Created Date	3/14/2014
Task Description	Demolition Oversight	Completed Date	03/14/2014
Template	FALSE	Auto Closed	FALSE

Client / Project

Client	Freedom Industries, Inc.
Project Number	
Project Name	Freedom Industries, Inc.
PIC	
Project Manager	Jason Manzo

User Roles

Role	Employee	Due Date	Completed Date	Supervisor	Active
Developer	Gang, Bob	3/28/2014	3/14/2014	Cullen, Lucas	<input checked="" type="checkbox"/>
Developer	Lunin, Eric	3/28/2014	3/14/2014	Mosher, Tyler	<input checked="" type="checkbox"/>
HASP Reviewer	Gang, Bob	3/28/2014	3/14/2014	Cullen, Lucas	<input checked="" type="checkbox"/>
Quality Reviewer	Alonso, John	3/17/2014	3/17/2014	Cameron, Gary	<input checked="" type="checkbox"/>

Job Steps

Job Step No.	Job Step Description	Potential Hazard	Critical Action	H&S Reference	
1	Demolition Oversight	1	Slips trips and falls from poor housekeeping around demolition area could cause injury to hand or arm.	Maintain work area and minimize clutter near demolition area. Direct load demolition materials or place demolition material indiscrete piles. Remove potential hazards when possible. Mark hazards when it cannot be removed. Create and maintain awareness of hazard. Maintain barriers, designated walkways, fall hazard warning signage and traffic controls properly. Do not cross over caution tape, safety fencing etc.	
		2	Building collapse trapping workers or crushing workers.	Stay a minimum of 30 feet from demolition activities.	
		3	Potential high level of dust, fumes, vapors or particulates from tank residuals or demolition creating visibility or inhalation/contact hazards could result in exposure above occupational exposure limit or create an IDLH atmosphere causing an explosion or respiratory distress.	Visually monitor air for dust, and wet demolition materials as needed to control dust. Monitor for chemical vapors if hazard exists. The LEL must be tested in tanks with residuals or where flammable gases are likely to be present.	
		4	Excessive noise from demolition equipment and activites could cause hearing damage.	Wearing hearing protection (ear plugs/muffs) with a minimum of 20 dBA when working around noisy equipment and demolition activities. Increase distance from noise hazard when practical.	
		5	Potential Leaks of Petroleum Fluids and Lubricants from demolition equipment, support equipment or oils, mercury battery acids and other chemicals from demoltion of structures could cause skin burns and/or dermal and respiratory absorbtion of poisonous materials.	Make sure all authorized personnel including subcontractors perform equipment inspections looking for leaks, cracked hoses, and loose fittings. Promptly and properly repair all leaks. Remove residuals from tanks and store in USDOT approved waste transportation containers.	

		6	Unauthorized Entry could cause crushing, laceration to extremities or slip trip or fall injuries to bystanders	Mark site with demarcation tape, orange fencing, orange cones, etc. to prevent unauthorized / accidental entry. Make sure controls are adequate for isolating demolition materials after dark or when the site is unstaffed.	
		7	Contact with potentially impacted demolition materials could cause dermal and respiratory exposure to employees.	Direct load into USDOT-approved containers or isolate any visually impacted materials. Wear Chemical resistant Nitrile gloves if required to handle potentially impacted material	
		8	Working Around Heavy Machinery could cause crushing injury to employees	Maintain distance from excavation equipment in excess of the swing radius. Maintain eye contact with operators if required to enter within swing radius of equipment. Wear Type II Safety vest. Be aware of and avoid standing in red zones (equipment operator "blind-spots"). No personnel are permitted to stand underneath suspended loads.	

PPE Personal Protective Equipment			
Type	Personal Protective Equipment	Description	Required
Dermal Protection	long sleeve shirt/pants		Required
Eye Protection	safety glasses		Required
Foot Protection	steel-toe boots		Required
Hand Protection	chemical resistant gloves (specify type)	When handling visually impacted	Required
	work gloves (specify type)	Leather for demolition materials	Required
Head Protection	hard hat		Required
Hearing Protection	ear muffs	recommended	Required
	ear plugs	When working near heavy equipment	Required
Miscellaneous PPE	traffic vest--Class II or III		Required
Respiratory Protection	dust mask	when dust is present	Required

Supplies			
Type	Supply	Description	Required
Communication Devices	mobile phone		Required
Decontamination	Decon supplies (specify type)		Required
Miscellaneous	fire extinguisher		Required
	first aid kit		Required
	flashlight	for inspecting dark areas	Required
Personal	eye wash (specify type)	bottle	Required
	insect repellent		Recommended
	sunscreen		Recommended
Traffic Control	Other	Cones/tape to delineate trenches prior	Required

Job Safety Analysis

General

JSA ID	346	Status	(3) Completed
Job Name	Environmental-Air knife/hydro knife	Created Date	5/29/2009
Task Description	Air knife/Hydro knife	Completed Date	06/15/2009
Template	True	Auto Closed	False

Client / Project

Client	ARCADIS-AGMI
Project Number	000000100000
Project Name	GENERAL OVERHEAD
PIC	
Project Manager	NO PROJECT MANAGER

User Roles

Role	Employee	Due Date	Completed Date	Supervisor	Active
Developer	Coppola, Mija	5/16/2012	5/29/2009	Coates, Gary	<input checked="" type="checkbox"/>
HASP Reviewer	Moyers, Sam	6/12/2009	6/15/2009	Coppola, Mija	<input checked="" type="checkbox"/>

Job Steps

Job Step No.	Job Step Description	Potential Hazard	Critical Action	H&S Reference
1	Check and clear proposed hydro-knife locations for the presence of underground and overhead utilities	1 Staff can be hit by vehicular traffic	Wear reflective traffic vest. Establish work zone with cones.	Utility Clearance H&S Standard: ARCHSFS019
		2 Underground utilities can be encountered	Follow ARCADIS policy on utility location	
2	Clear hole using the hydro-knife	1 Subsurface could have material that may contain rocks/sharp objects. Flying debris could cause injury to eyes, face, arms and legs; Water spray could contain mud, sharp debris or chemicals of concern;	Stay back a minimum of five feet from the hydro-knife while in operation by the contractor. Wear safety glasses, leather gloves, hardhat.	
		2 Operation of the hydro-knife generates excessive noise.	Hearing protection is required when the equipment is in operation	
		3 Vacuum unit has a large amount of suction.	Do not put any part of your body near the end of the hose.	
3	Barricade open holes	1 Holes can be difficult to see depending on their size, and site workers could twist their ankle or fall if they step on an open hole.	Holes can be as large as 6-8 inches in diameter and as deep as 7 feet. Heavy cones, orange barrels or cones with caution tape should be used to protect the holes.	
		2 Lifting hazards from carrying heavy cones or orange barrels.	Minimize number of cones lifted at one time. Use team lift approach when possible.	

PPE Personal Protective Equipment

Type	Personal Protective Equipment	Description	Required
Eye Protection	safety glasses		Required
Foot Protection	steel-toe boots		Required
Hand Protection	work gloves (specify type)	leather	Required
Head Protection	hard hat		Required
Hearing Protection	ear plugs		Required
Miscellaneous PPE	traffic vest--Class II or III		Required

Supplies

Type	Supply	Description	Required
Miscellaneous	fire extinguisher		Required
	first aid kit		Required
Personal	eye wash (specify type)		Required
Traffic Control	traffic cones		Required

Job Safety Analysis

General

JSA ID	44	Status	(3) Completed
Job Name	Environmental-Drilling, soil sampling, well installation	Created Date	2/4/2009
Task Description	Drilling, soil sampling, and well installation	Completed Date	02/04/2009
Template	True	Auto Closed	False

Client / Project

Client	ARCADIS-AGMI
Project Number	000000100000
Project Name	GENERAL OVERHEAD
PIC	
Project Manager	NO PROJECT MANAGER

User Roles

Role	Employee	Due Date	Completed Date	Supervisor	Active
Developer	Coppola, Mija	6/28/2012	2/4/2009	Coates, Gary	<input checked="" type="checkbox"/>
HASP Reviewer	Coppola, Mija	2/6/2009	2/2/2009	Coates, Gary	<input checked="" type="checkbox"/>

Job Steps

Job Step No.	Job Step Description	Potential Hazard	Critical Action	H&S Reference
1	Set up necessary traffic and public access controls	1 Struck by vehicle due to improper traffic controls	Use a buddy system for placing site control cones and/or signage. Position vehicle so that you are protected from moving traffic. Wear Class II traffic vest	
2	Utility Clearance	1 Potential to encounter underground or above ground utilities while drilling.	Complete utility clearance in accordance with the ARCADIS Utility Clearance H&S Standard.	ARCADIS H&S Standard ARCHSFS019
3	General drill rig operation	1 Excessive noise is generated by rig operation.	When the engine is used at high RPMs or soil samples are being collected, use hearing protection.	
		2 During drill rig operation, surfaces will become hot and cause burns if touched, and COCs in the soils more readily vaporize generating airborne contaminates.	Due to friction and lack of a drilling fluid, heat will be produced during this method. Mainly drill augers. Be careful handling split spoons. Wear proper work gloves. When soils and parts become heated, the COC could volatilize. Air monitoring should always be performed in accordance with the HASP.	
		3 Moving parts of the drilling rig can pull you in causing injury. Pinch points on the rig and auger connections can cause pinching or crushing of body parts.	Stay at least 5 feet away from moving parts of the drill rig. Know where the kill switch is, and have the drillers test it to verify that it is working. Do not wear loose clothing, and tie long hair back. Avoid wearing jewelry while drilling. Cone off the work area to keep general public away from the drilling rig.	
		4 Dust and debris can cause eye injury and soil cuttings and/or water could contain COCs.	Wear safety glasses and stay as far away from actual drilling operation as practicable. Wear appropriate gloves to protect from COCs.	
		5 Drilling equipment laying on the ground (i.e. augers, split spoons, decon equipment, coolers, etc), create a tripping hazard. Water from decon buckets generate mud and cause a slipping hazard.	Keep equipment and trash picked up, and store away from the primary work area.	
		6 The raised derrick can strike overhead utilities, tree limbs or other elevated items	Never move the rig with the derrick up. Ensure there is proper clearance to raise the derrick, and that you are far enough away from overhead power lines. See the Utility Clearance H&S Standard for guidance.	

4	Mudd rotary drilling	1	The raised derrick can strike overhead utilities, tree limbs or other elevated items.	Never move the rig with the derrick up. Ensure there is proper clearance to raise the derrick, and that you are far enough away from overhead power lines. See the Utility Location H&S policy and procedure for guidance.	
		2	This technology uses fluid, which collects with sediments in large basin. Fluid can splash out and cause slipping/mud hazard. Liquid mixture can splash into your eyes.	Wear rubber boots if needed, and keep clear of muddy/wet area as much as practicable. If area becomes excessively muddy, consider mud spikes or covering the area with a material that improves traction. Wear safety glasses.	
5	Hollow stem auger drilling	1	All hazards in step 3 apply. Additionally, The raised derrick can strike overhead utilities, tree limbs or other elevated items	Never move the rig with the derrick up. Ensure there is proper clearance to raise the derrick, and that you are far enough away from overhead power lines. See the Utility Location H&S policy and procedure for guidance.	
		2	Hands or fingers can get caught and crushed if trying to clean by hand or with tools while the auger is still turning.	Auger should always be stopped and clutch disengaged prior to cleaning.	
6	Air Rotary Drilling	1	This drilling method works with high air pressure and can generate flying debris that can strike your body or get in your eyes.	When the drill rig is being driven into media, it will produce flying debris. The flaps behind the drill rig should stay closed whenever possible to reduce the risk of flying debris. Safety glasses and hard hat should always be worn when the drill rig is operating. When penetrating asphalt, protect surrounding cars that may be present to avoid damage to pain or windshields.	
		2	The raise derrick can strike overhead utilities, tree limbs or other elevated items.	Never move this rig with the derrick up. Ensure there is proper clearance to raise the derrick and that you are far enough away from overhead power lines. See the Utility clearance H&S Standard for guidance.	
		3	When drilling through bedrock prior to groundwater, dust can be produced from pulverization. Inhalation of dusts/powder can occur.	Supplemental water should be used to manage dust and/or dust masks should be used if necessary.	
7	Reverse rotary drilling	1	This method will use fresh water to pump out drill cuttings through the center of the casing. Water/sediment mixture is generated and could cause contact with impacted soils or groundwater.	Ensure the pit construction can hold the amount of cuttings that are anticipated. Air monitoring should also be used of pit area.	
		2	Fire hydrants are often used for water source. Hydrants deliver water at high pressure. Pressurized water can cause flying parts/debris and excessive slipping hazards.	Water usage from fire hydrants should be cleared with local municipalities prior to use. Only persons that know how to use the hydrant should be performing this task. Ensure all connections are tight, and hose line is not run over to cut by traffic. Any leaks from the hydrant should be reported immediately.	
		3	Settling pit construction can cause tripping hazard from excavated soils, and plastic sheeting can cause slipping.	Cone off the area to keep the general public/visitors away from the settling pit. Ensure proper sloping of excavation.	
		4	The raised derrick can strike overhead utilities, tree limbs or other elevated items.	Never move the rig with the derrick up. Ensure there is proper clearance to raise the derrick, and that you are far enough away from overhead power lines. See the Utility Location H&S policy and procedure for guidance.	

8	Rotosonic drilling	1	Fire hydrants are often used for water source. Hydrants deliver water at high pressure. Pressurized water can cause flying parts/debris and excessive slipping hazards.	Water usage from fire hydrants should be cleared with local municipalities prior to use. Only persons that know how to use the hydrant should be performing this task. Ensure all connections are tight, and hose line is not run over to cut by traffic. Any leaks from the hydrant should be reported immediately.	
		2	This method requires a lot of clearance. The drill head can turn 90 degrees to attach to the next drill flight or casing. This usually requires a large support truck to park directly behind the rig. As the drill head raises the new casing flight is angled down at the same time until it can be turned completely vertical.	Ensure sufficient overhead clearance.	
		3	Heavy lifting of cores can cause muscle strain.	Always use 2 people to move core containers. Use caution moving core samples to layout area. Plan layout area to ensure adequate aisle space between core runs for logging. Keep back straight and use job rotation.	
		4	The rotosonic drill head can move very quickly up and down while working on a borehole. Moving parts can strike someone or catch body parts.	The operator and helper must communicate and stay clear of the path of the drill head. The drill utilizes two large hydraulic clamps to continuously hold casings while load/unloading previous casings. Do not wear loose clothing.	
9	Direct push drilling	1	The drill rods will be handled by workers most of the time rather than the rig doing it, therefore pinch points can cause lacerations and crushing of fingers/body parts.	Keep a minimum of 5 feet away from drill rig operation and moving parts.	
		2	The direct push rigs are usually meant to fit in spaces where larger rig can't. Tight spaces can pin workers.	Do not put yourself between the rig and a fixed object. Use Spotters or a tape measure to ensure clearances in tight areas. Pre-plan equipment movement from one location to the next.	
		3	Some direct push equipment is controlled by wireless devices. These controls can fail and equipment can strike workers or cause damage to property.	The drill rig should be used in a large open area to test wireless controls prior to moving to boring locations. The operator of the rig will test the kill switch with wireless remote prior to use. Operator will stay in range of rig while moving so that wireless signal will not be too weak and cause errors to the controls.	
		4	Sampling sleeves must be cut to obtain access to soil. Cutting can cause lacerations.	It's preferable to let the driller cut the sleeves open. Many drillers have holders for the sleeve to allow for stability when cutting. If you cut the sleeves, use a hook blade, change blade regularly, and cut away from the body.	
		5	Soil cores may contain contaminated media.	Wear nitrile gloves and safety glasses for protection from contaminated media when logging soil borings.	
10	Rock coring	1	Flying debris can hit workers or cause debris to get in eyes.	Rock chips or overburden may become airborne from drilling method. Wear safety glasses and hard hat and remain at a safe distance from back of drill rig.	
		2	Heavy lifting of cores can cause muscle strain.	Always use 2 people to move core containers. Use caution moving core samples to layout area. Plan layout area to ensure adequate aisle space between core runs for logging. Keep back straight and use job rotation.	

11	Sample collection and processing	1	Injuries can result from pinch points on sampling equipment, and from breakage of sample containers.	Care should be taken when opening sampling equipment. Look at empty containers before picking them up, and do not over-tighten container caps. Use dividers to store containers in the cooler so they do not break.	Sample Cooler Handling JSA
		2	Lifting heavy coolers can cause back injuries.	Use two people to move heavy coolers. Use proper lifting techniques.	
12	Monitoring well installation	1	Same hazards as in Step 3 with general drill rig operation	See step 3	
		2	Monitoring well construction materials can clutter the work area causing tripping hazards.	Well construction materials should be picked up during the well installation process.	
		3	Heavy lifting can cause muscle strains, and cutting open bags can cause lacerations.	Well construction materials are usually 50 lbs or greater. Team lift or use drill rig to hoist bags. Always use work gloves while cutting open bags.	
		4	Well pack material (i.e. sand, grout, bentonite) can become airborne and get in your eyes.	Wear safety glasses for protection from airborne sand and dust.	
		5	Cutting the top of the well to size can cause jagged/sharp edges on the top of the well casing.	Wear gloves when working with the top of the well casing, and file any sharp jagged edges that resulted from cutting to size.	
13	Soil cutting and purge water management	1	Moving full drums can cause back injury, or pinching/crushing injury.	Preferably have the drilling contractor move full drums with their equipment. If this is not practicable, use lift assist devices such as drum dollies, lift gates, etc. Employ proper lifting techniques, and perform TRACK to identify pinch/crush points. Wear leather work gloves, and clear all walking and work areas of debris prior to moving a drum.	Drum Handling JSA

PPE Personal Protective Equipment			
Type	Personal Protective Equipment	Description	Required
Eye Protection	safety glasses		Required
Foot Protection	steel-toe boots		Required
Hand Protection	chemical resistant gloves (specify type)	Nitrile	Required
	work gloves (specify type)	leather	Required
Head Protection	hard hat		Required
Hearing Protection	ear plugs		Required
Miscellaneous PPE	traffic vest--Class II or III		Required
Respiratory Protection	dust mask		Recommended

Supplies			
Type	Supply	Description	Required
Communication Devices	mobile phone		Required
Decontamination	Decon supplies (specify type)	Driller to provide and manage	Recommended
Miscellaneous	fire extinguisher		Required
	first aid kit		Required
Personal	eye wash (specify type)	bottle	Required
	water/fluid replacement		Recommended
Traffic Control	traffic cones		Required

Review Comments		
Reviewer	Comments	
Employee: Role Review Type Completed Date	Coppola, Mija HASP Reviewer Approve 2/2/2009	

Job Safety Analysis

General

JSA ID	166	Status	(3) Completed
Job Name	Environmental-Sample cooler handling	Created Date	5/1/2009
Task Description	Sample cooler handling	Completed Date	05/13/2009
Template	True	Auto Closed	False

Client / Project

Client	ARCADIS-AGMI
Project Number	000000100000
Project Name	GENERAL OVERHEAD
PIC	
Project Manager	NO PROJECT MANAGER

User Roles

Role	Employee	Due Date	Completed Date	Supervisor	Active
Developer	Coppola, Mija	12/19/2011	5/11/2009	McBurney, Lowell	<input checked="" type="checkbox"/>
HASP Reviewer	Moyers, Sam	5/25/2009	5/13/2009	Kundert, Brian	<input checked="" type="checkbox"/>

Job Steps

Job Step No.	Job Step Description	Potential Hazard	Critical Action	H&S Reference
1	Transfer field samples to sample packing area	1	Lifting heavy coolers may result in muscle strain especially to lower back.	Use proper lifting techniques and keep back straight. Use buddy system for large coolers, Use mechanical aids like hand trucks if readily available to move coolers. Do not over fill coolers with full sample containers for temporary movement to the sample prep area. Ensure an adequate supply of sample coolers are in field.
		2	Hazards to hands from broken glass caused by over tightening lids or improper placement in cooler	Inspect all bottles and bottle caps for cracks/leaks before and after filling container. Do not over tighten sample lids. Clean up any broken bottles immediately, avoid contact with sample preservatives. Wear leather gloves when handling broken glass.
		3	Exposure to chemicals (acid preservatives or site contaminants) on the exterior of sample bottles after filling.	Wear protective gloves for acid preservatives and safety glasses with side shields during all sample container handling activities (before and after filling), Once filled follow project specific HASP PPE requirements for skin and eye protection.
		4	Samples containing hazardous materials may violate DOT/IATA HazMat shipping regulations	All persons filling a sample bottle or preparing a cooler for shipment must have complete ARCADIS DOT HazMat shipping training. Compare the samples collected to the materials described in the Shipping Determination for the Project and ensure consistent. Re-perform all Shipping determinations if free product is collected and not anticipated during planning.
2	Sample cooler selection	1	Sample coolers with defective handles, lid hinges, lid hasps cracked or otherwise damaged may result in injury (cuts to hands, crushing of feet if handle breaks etc)	ARCADIS Shipping Guide US-001
		2	Selection of excessively large coolers introduces lifting hazards once the cooler is filled.	Select coolers and instruct lab to only provide coolers of a size appropriate for the material being shipped. For ordinary sample shipping sample coolers should be 48 quart capacity or smaller to reduce lifting hazards.
3	Pack Samples	1	Pinch points and abrasions to hands from cooler lid closing unexpectedly	Beware that lid could slam shut; block/brace if needed; be wary of packing in strong winds. New coolers may be more prone to self closing, tilt cooler back slightly to facilitate keeping lid open.

3	Pack Samples	2	Awkward body positions and contact stress to legs and knees when preparing coolers on irregular or hard ground surfaces.	Plan cooler prep activities. Situate cooler where neutral body positions can be maintained if practical, like truck tailgate. Avoid cooler prep on rough gravel surfaces unless knees and legs protected during kneeling.
		3	Frostbite or potential for oxygen deficiency when packing with dry ice. Contact cold stress to fingers handling blue ice or wet ice	Dry ice temperature is -109.30F. Wear thermal protective gloves. DO NOT TOUCH with bare skin! Dry ice sublimates at room temp and could create oxygen deficiency in closed environment. Maintain adequate ventilation! Do not keep dry ice in cab of truck. Wear gloves when handling blue ice or gaging wet ice. Dry Ice is DOT regulated for air shipping, follow procedures in Shipping Determination.
4	Sealing, labeling and Marking Cooler	1	Cuts to hands and forearms from strapping tape placement or removing old tape and labels	Do not use a fixed, open-blade knife to remove old tags/labels, USE SCISSORS or other safety style cutting device. Only use devices designed for cutting. Do not hurry through task.
		2	Lifting and awkward body position hazards from taping heavy coolers, dropping coolers on feet during taping.	Do not hurry through the taping tasks, ensure samples in cooler are evenly distributed in cooler to reduce potential for overhanging cooler falling off edge of tailgate/table when taping.
		3	Improper labeling and marking may result in violation of DOT/IATA HazMat shipping regulations delaying shipment or resulting in regulatory penalty	Do not deviate from ARCADIS Shipping Guide or Shipping Determination marking or labeling requirements.
5	Offering sample cooler to a carrier or lab courier for shipment.	1	Lifting heavy coolers may result in muscle strain especially to lower back.	See lifting hazard controls above.
		2	Carrier refusal to accept cooler may cause shipping delay and/or result in violation of DOT HazMat shipping regulations.	Promptly report all rejected and refused shipments to the ARCADIS DOT Program Manager. Do Not re-offer shipment if carrier requires additional labels markings or paperwork inconsistent with your training or Shipping Determination without contacting the ARCADIS DOT Compliance Manager.

PPE Personal Protective Equipment			
Type	Personal Protective Equipment	Description	Required
Eye Protection	safety glasses		Required
Hand Protection	chemical resistant gloves (specify type)	nitrile	Required
	work gloves (specify type)	leather	Required

Supplies			
Type	Supply	Description	Required
Miscellaneous	Other	Scissors	Required

Review Comments		
Reviewer	Comments	
Employee: Role Review Type Completed Date	Moyers, Sam HASP Reviewer Revise 5/11/2009	Kevlar is required? Leather work gloves are listed. i suggest just leather gloves.
Employee: Role Review Type Completed Date	Moyers, Sam HASP Reviewer Approve 5/13/2009	

Job Safety Analysis

General

JSA ID	4079	Status	(3) Completed
Job Name	General Industry-Site inspection/walkover - undeveloped	Created Date	12/9/2010
Task Description	Site Inspection	Completed Date	12/14/2010
Template	True	Auto Closed	False

Client / Project

Client	ARCADIS-AGMI
Project Number	000000100000
Project Name	GENERAL OVERHEAD
PIC	
Project Manager	

User Roles

Role	Employee	Due Date	Completed Date	Supervisor	Active
Developer	Coppola, Mija	1/26/2012	12/10/2010	McBurney, Lowell	<input checked="" type="checkbox"/>
HASP Reviewer	Tremblay, Tony	12/24/2010	12/14/2010	Kundert, Brian	<input checked="" type="checkbox"/>
Quality Reviewer	Brien, Jason	12/14/2010	12/14/2010	Averill, Corey	<input checked="" type="checkbox"/>

Job Steps

Job Step No.	Job Step Description	Potential Hazard	Critical Action	H&S Reference
1	Undeveloped Site Walk (Winter Conditions)	1 Slippery/icy conditions	Use caution and proper footwear with traction	
		2 Eye/face injury	Use caution when walking through trees and brush. Wear proper eye protection to avoid eye injury	
		3 Hypothermia/frostbite	Assess weather conditions and wear proper clothing to avoid hypothermia/frostbite and freezing	
		4 Falling ice/snow	Assess the site for falling ice/snow from trees/powerlines. Use caution when walking around trees and powerlines. Wear hard hat	
		5 Stray animals	Make lots of noise while walking through the site. Carry repellent in the event of encountering stray animals. If a dangerous or aggravated animal is spotted, leave the area, return to your vehicle and contact animal control.	
		6 Vehicular traffic	Asses the site and the surrounding area for vehicle traffic. Use caution when walking near busy roadways. Wear type II or III traffic vest.	
2	Undeveloped Site Walk (Summer Conditions)	1 Slips/trips/falls	Use caution when walking on un-even surfaces. Use proper footwear with traction	
		2 Eye injury	Use caution when walking through areas of trees and brush. Wear proper eye protection to avoid eye injury from tree limbs	
		3 Dehydration	Drink plenty of water and avoid long periods of direct sun exposure	
		4 Sunburn	Wear sunscreen. Avoid long periods of direct sun exposure. Work in the shade if possible.	
		5 Vehicular traffic	Assess the site and the surrounding area for vehicular traffic. Use caution when walking near busy roadways. Wear type II or III traffic vest.	
		6 Stray animals, ticks, bugs	Make lots of noise when traveling through the site and carry repellent spray. If a dangerous or aggravated animal is spotted, leave the area and return to your vehicle and contact animal control. Wear long pants/long sleeve shirt and use insect repellent as necessary	

PPE Personal Protective Equipment			
Type	Personal Protective Equipment	Description	Required
Dermal Protection	long sleeve shirt/pants		Required
Foot Protection	steel-toe boots		Required

Supplies			
Type	Supply	Description	Required
Communication Devices	mobile phone		Required
Miscellaneous	first aid kit		Required
Personal	eye wash (specify type)		Required
	insect repellent		Recommended
	sunscreen		Recommended

Review Comments		
Reviewer	Comments	
Employee: Tremblay, Tony Role HASP Reviewer Review Type Revise Completed Date 12/10/2010	Please refer to JLA 1602 and use the exterior site walk information as a template for this JLA. Thanks Ahren	
Employee: Tremblay, Tony Role HASP Reviewer Review Type Approve Completed Date 12/14/2010		
Employee: Brien, Jason Role Quality Reviewer Review Type NA Completed Date 12/14/2010	Well thought out. Appropriate hazards and critical actions have been identified.	

Job Safety Analysis

General

JSA ID	1964	Status	(3) Completed
Job Name	Environmental-Other	Created Date	3/25/2010
Task Description	Storm Water Sampling from Manhole, Catch	Completed Date	04/13/2010
Template	FALSE	Auto Closed	FALSE

Client / Project

Client	
Project Number	
Project Name	
PIC	
Project Manager	

User Roles

Role	Employee	Due Date	Completed Date	Supervisor	Active
Developer	Keller, Lyndsay	4/13/2010	4/13/2010	Grumbly, Tiffanee	<input checked="" type="checkbox"/>
HASP Reviewer	Grumbly, Tiffanee	4/27/2010	4/13/2010	Neal, Aaron	<input checked="" type="checkbox"/>

Job Steps

Job Step No.	Job Step Description	Potential Hazard	Critical Action	H&S Reference
1	Load Required Equipment/Supplies into Vehicle	1 Lifting hazards and back strain. Appropriate PPE not on site.	Review HASP/JLA for necessary PPE. Refer to HASP for emergency procedures and contact numbers. Use proper lifting techniques. Request assistance when lifting heavy equipment.	
2	Mobilize	1 Driving/travel may be conducted during early/late hours of the day.	Keep alert and pay attention to driving hazards. Follow Smith System Driving Training.	
3	Arrival	1 N/A	Notify site contact to ensure he/she is aware of your arrival.	ARC HSSP0002
4	Perform Tailgate Health and Safety Briefing	1 N/A	Familiarize yourself with emergency procedures and the HASP.	
5	Preparing to Sample Storm Water.	1 Biological hazards, pinchpoints, sharp objects, exposure to affected ground water. Injuries from slip, trip and fall. Muscle strain.	Set up work area and materials to reduce tripping hazards. Maintain good housekeeping. Wear proper PPE including safety boots, knee pads and safety glasses. Use proper lifting and body positioning. Wear chemical protective gloves while collecting the sample. When lifting, keep loads close to body, avoid twisting torso, and use legs, not back, to lift loads.	
6	Inventory/Inspect the Manhole (if applicable)	1 Inhalation hazard, slips, trips, and falls.	Stand upwind of the manhole, if any odor is observed, allow to vent prior to performing inspection. Ensure that the manhole cover is removed far enough away from the work area to prevent a tripping hazard. Secure the area to prevent unauthorized personnel from	
7	Containerize Samples. Prepare Chain of Custody. Pack and/or Move Ice Chests.	1 Cuts to hand and potential contact with hazardous chemicals.	Make sure glass sample container is not cracked or broken. Ensure proper PPE is used to prevent dermal exposure.	
		2 Splash or struck while completing labels and COC.	Note hazard of surroundings and complete COC in a safe location away from hazards or distractions.	
		3 Back strain from lifting full ice chests.	When lifting, keep loads close to body, avoid twisting torso, and use legs, not back, to lift loads. Get help when moving heavy or awkward loads.	

8	Decontaminate the Sampling Equipment	1	Chemical exposure to affected ground water and cross contamination, release to the environment.	Wear gloves and splash protection, establish a decon station, thoroughly decontaminate tools and equipment after each sample is collected.	
9	Load Equipment/Supplies into Vehicle	1	Lifting hazards and back strain.	Use proper lifting techniques. Request assistance when lifting heavy equipment.	
10	Departure	1	N/A	Notify site contact of departure.	ARC HSSP0002
11	Demobilize	1	Driving/travel may be conducted during early/late hours of the day.	Keep alert and pay attention to driving hazards. Follow Smith System Driving training.	

PPE Personal Protective Equipment			
Type	Personal Protective Equipment	Description	Required
Eye Protection	safety glasses		Required
Foot Protection	steel-toe boots		Required
Hand Protection	chemical resistant gloves (specify type)	Nitrile	Required
Head Protection	hard hat		Required
Hearing Protection	ear plugs		Recommended
Miscellaneous PPE	traffic vest--Class II or III		Required

Supplies			
Type	Supply	Description	Required
Miscellaneous	Other	ARCADIS ID Badge	Required
	Other	Safety Cones	Required
	Other	HASP	Required

Attachment 3

Safety Data Sheets

MATERIAL SAFETY DATA SHEET

ALCONOX®

Prepared to U.S. OSHA, CMA, ANSI, Canadian WHMIS, Australian WorkSafe, Japanese Industrial Standard JIS Z 7250:2000, and European Union REACH Regulations



SECTION 1 - PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: **ALCONOX®**
CHEMICAL FAMILY NAME: Detergent.
PRODUCT USE: Critical-cleaning detergent for laboratory, healthcare and industrial applications
U.N. NUMBER: Not Applicable
U.N. DANGEROUS GOODS CLASS: Non-Regulated Material
SUPPLIER/MANUFACTURER'S NAME: Alconox, Inc.
ADDRESS: 30 Glenn St., Suite 309, White Plains, NY 10603. USA
EMERGENCY PHONE: **TOLL-FREE in USA/Canada** 800-255-3924
International calls 813-248-0585
BUSINESS PHONE: 914-948-4040
DATE OF PREPARATION: May 2011
DATE OF LAST REVISION: February 2008

SECTION 2 - HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: This product is a white granular powder with little or no odor. Exposure can be irritating to eyes, respiratory system and skin. It is a non-flammable solid. The Environmental effects of this product have not been investigated.

US DOT SYMBOLS

Non-Regulated

CANADA (WHMIS) SYMBOLS



EUROPEAN and (GHS) Hazard Symbols



Signal Word: **Warning!**

EU LABELING AND CLASSIFICATION:

Classification of the substance or mixture according to Regulation (EC) No1272/2008 Annex 1

EC# 205-633-8 This substance is not classified in the Annex I of Directive 67/548/EEC

EC# 268-356-1 This substance is not classified in the Annex I of Directive 67/548/EEC

EC# 231-838-7 This substance is not classified in the Annex I of Directive 67/548/EEC

EC# 231-767-1 This substance is not classified in the Annex I of Directive 67/548/EEC

EC# 207-638-8 Index# 011-005-00-2

EC# 205-788-1 This substance is not classified in the Annex I of Directive 67/548/EEC

GHS Hazard Classification(s):

Eye Irritant Category 2A

Hazard Statement(s):

H319: Causes serious eye irritation

Precautionary Statement(s):

P260: Do not breath dust/fume/gas/mist/vapors/spray

P264: Wash hands thoroughly after handling

P271: Use only in well ventilated area.

P280: Wear protective gloves/protective clothing/eye protection/face protection/

Hazard Symbol(s):

[Xi] Irritant

MATERIAL SAFETY DATA SHEET

ALCONOX®

Risk Phrases:

R20: Harmful by inhalation
R36/37/38: Irritating to eyes, respiratory system and skin

Safety Phrases:

S8: Keep container dry
S22: Do not breath dust
S24/25: Avoid contact with skin and eyes

HEALTH HAZARDS OR RISKS FROM EXPOSURE:

ACUTE: Exposure to this product may cause irritation of the eyes, respiratory system and skin. Ingestion may cause gastrointestinal irritation including pain, vomiting or diarrhea.

CHRONIC: This product contains an ingredient which may be corrosive.

TARGET ORGANS:

ACUTE: Eye, respiratory System, Skin

CHRONIC: None Known

SECTION 3 - COMPOSITION and INFORMATION ON INGREDIENTS

HAZARDOUS INGREDIENTS:	CAS #	EINECS #	ICSC #	WT %	HAZARD CLASSIFICATION; RISK PHRASES
Sodium Bicarbonate	144-55-8	205-633-8	1044	33 - 43%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Sodium (C10 – C16) Alkylbenzene Sulfonate	68081-81-2	268-356-1	Not Listed	10 – 20%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Sodium Tripolyphosphate	7758-29-4	231-838-7	1469	5 - 15%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Tetrasodium Pyrophosphate	7722-88-5	231-767-1	1140	5 - 15%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Sodium Carbonate	497-19-8	207-638-8	1135	1 - 10%	HAZARD CLASSIFICATION: [Xi] Irritant RISK PHRASES: R36
Sodium Alcohol Sulfate	151-21-3	205-788-1	0502	1 – 5%	HAZARD CLASSIFICATION: None RISK PHRASES: None
Balance of other ingredients are non-hazardous or less than 1% in concentration (or 0.1% for carcinogens, reproductive toxins, or respiratory sensitizers).					

NOTE: ALL WHMIS required information is included in appropriate sections based on the ANSI Z400.1-2004 format. This product has been classified in accordance with the hazard criteria of the CPR and the MSDS contains all the information required by the CPR, EU Directives and the Japanese Industrial Standard JIS Z 7250: 2000.

SECTION 4 - FIRST-AID MEASURES

Contaminated individuals of chemical exposure must be taken for medical attention if any adverse effect occurs. Rescuers should be taken for medical attention, if necessary. Take copy of label and MSDS to health professional with contaminated individual.

EYE CONTACT: If product enters the eyes, open eyes while under gentle running water for at least 15 minutes. Seek medical attention if irritation persists.

SKIN CONTACT: Wash skin thoroughly after handling. Seek medical attention if irritation develops and persists. Remove contaminated clothing. Launder before re-use.

INHALATION: If breathing becomes difficult, remove victim to fresh air. If necessary, use artificial respiration to support vital functions. Seek medical attention if breathing difficulty continues.

INGESTION: If product is swallowed, call physician or poison control center for most current information. If professional advice is not available, do not induce vomiting. Never induce vomiting or give diluents (milk or water) to someone who is unconscious, having convulsions, or who cannot swallow. Seek medical advice. Take a copy of the label and/or MSDS with the victim to the health professional.

MEDICAL CONDITIONS AGGRAVATED BY EXPOSURE: Pre-existing skin, or eye problems may be aggravated by prolonged contact.

RECOMMENDATIONS TO PHYSICIANS: Treat symptoms and reduce over-exposure.

MATERIAL SAFETY DATA SHEET

ALCONOX®

SECTION 5 - FIRE-FIGHTING MEASURES

FLASH POINT:

Not Flammable

AUTOIGNITION TEMPERATURE:

Not Applicable

FLAMMABLE LIMITS (in air by volume, %):

Lower (LEL): NA Upper (UEL): NA

FIRE EXTINGUISHING MATERIALS:

As appropriate for surrounding fire. Carbon dioxide, foam, dry chemical, halon, or water spray.

UNUSUAL FIRE AND EXPLOSION HAZARDS:

This product is non-flammable and has no known explosion hazards.

Explosion Sensitivity to Mechanical Impact:

Not Sensitive.

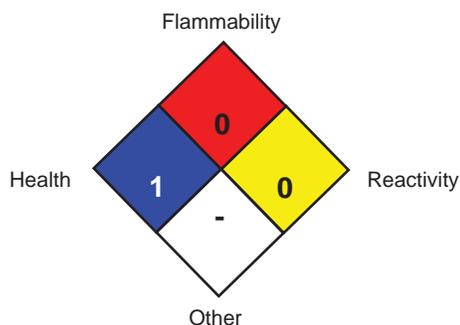
Explosion Sensitivity to Static Discharge:

Not Sensitive

SPECIAL FIRE-FIGHTING PROCEDURES:

Incipient fire responders should wear eye protection. Structural firefighters must wear Self-Contained Breathing Apparatus and full protective equipment. Isolate materials not yet involved in the fire and protect personnel. Move containers from fire area if this can be done without risk; otherwise, cool with carefully applied water spray. If possible, prevent runoff water from entering storm drains, bodies of water, or other environmentally sensitive areas.

NFPA RATING SYSTEM



HMIS RATING SYSTEM

HAZARDOUS MATERIAL IDENTIFICATION SYSTEM			
HEALTH HAZARD (BLUE)			1
FLAMMABILITY HAZARD (RED)			0
PHYSICAL HAZARD (YELLOW)			0
PROTECTIVE EQUIPMENT			
EYES	RESPIRATORY	HANDS	BODY
	See Sect 8		See Sect 8
For Routine Industrial Use and Handling Applications			

Hazard Scale: 0 = Minimal 1 = Slight 2 = Moderate 3 = Serious 4 = Severe * = Chronic hazard

SECTION 6 - ACCIDENTAL RELEASE MEASURES

SPILL AND LEAK RESPONSE: Personnel should be trained for spill response operations.

SPILLS: Contain spill if safe to do so. Prevent entry into drains, sewers, and other waterways. Sweep, shovel or vacuum spilled material and place in an appropriate container for re-use or disposal. Avoid dust generation if possible. Dispose of in accordance with applicable Federal, State, and local procedures (see Section 13, Disposal Considerations).

SECTION 7 - HANDLING and STORAGE

WORK PRACTICES AND HYGIENE PRACTICES: As with all chemicals, avoid getting this product ON YOU or IN YOU. Wash thoroughly after handling this product. Do not eat, drink, smoke, or apply cosmetics while handling this product. Avoid breathing dusts generated by this product. Use in a well-ventilated location. Remove contaminated clothing immediately.

STORAGE AND HANDLING PRACTICES: Containers of this product must be properly labeled. Store containers in a cool, dry location. Keep container tightly closed when not in use. Store away from strong acids or oxidizers.

MATERIAL SAFETY DATA SHEET

ALCONOX®

SECTION 8 - EXPOSURE CONTROLS - PERSONAL PROTECTION

EXPOSURE LIMITS/GUIDELINES:

Chemical Name	CAS#	ACGIH TWA	OSHA TWA	SWA
Sodium Bicarbonate	144-55-8	10 mg/m ³ Total Dust	15 mg/m ³ Total Dust	10 mg/m ³ Total Dust
Sodium (C10 – C16) Alkylbenzene Sulfonate	68081-81-2	10 mg/m ³ Total Dust	15 mg/m ³ Total Dust	10 mg/m ³ Total Dust
Sodium Tripolyphosphate	7758-29-4	10 mg/m ³ Total Dust	15 mg/m ³ Total Dust	10 mg/m ³ Total Dust
Tetrasodium Pyrophosphate	7722-88-5	5 mg/m ³	5 mg/m ³	5 mg/m ³
Sodium Carbonate	497-19-8	10 mg/m ³ Total Dust	15 mg/m ³ Total Dust	10 mg/m ³ Total Dust
Sodium Alcohol Sulfate	151-21-3	10 mg/m ³ Total Dust	15 mg/m ³ Total Dust	10 mg/m ³ Total Dust

Currently, International exposure limits are not established for the components of this product. Please check with competent authority in each country for the most recent limits in place.

VENTILATION AND ENGINEERING CONTROLS: Use with adequate ventilation to ensure exposure levels are maintained below the limits provided below. Use local exhaust ventilation to control airborne dust. Ensure eyewash/safety shower stations are available near areas where this product is used.

The following information on appropriate Personal Protective Equipment is provided to assist employers in complying with OSHA regulations found in 29 CFR Subpart I (beginning at 1910.132) or equivalent standard of Canada, or standards of EU member states (including EN 149 for respiratory PPE, and EN 166 for face/eye protection), and those of Japan. Please reference applicable regulations and standards for relevant details.

RESPIRATORY PROTECTION: Based on test data, exposure limits should not be exceeded under normal use conditions when using Alconox Detergent. Maintain airborne contaminant concentrations below guidelines listed above, if applicable. If necessary, use only respiratory protection authorized in the U.S. Federal OSHA Respiratory Protection Standard (29 CFR 1910.134), equivalent U.S. State standards, Canadian CSA Standard Z94.4-93, the European Standard EN149, or EU member states.

EYE PROTECTION: Safety glasses. If necessary, refer to U.S. OSHA 29 CFR 1910.133 or appropriate Canadian Standards.

HAND PROTECTION: Use chemical resistant gloves to prevent skin contact.. If necessary, refer to U.S. OSHA 29 CFR 1910.138 or appropriate Standards of Canada.

BODY PROTECTION: Use body protection appropriate to prevent contact (e.g. lab coat, overalls). If necessary, refer to appropriate Standards of Canada, or appropriate Standards of the EU, Australian Standards, or relevant Japanese Standards.

SECTION 9 - PHYSICAL and CHEMICAL PROPERTIES

PHYSICAL STATE:	Solid
APPEARANCE & ODOR:	White granular powder with little or no odor.
ODOR THRESHOLD (PPM):	Not Available
VAPOR PRESSURE (mmHg):	Not Applicable
VAPOR DENSITY (AIR=1):	Not Applicable.
BY WEIGHT:	Not Available
EVAPORATION RATE (nBuAc = 1):	Not Applicable.
BOILING POINT (C°):	Not Applicable.
FREEZING POINT (C°):	Not Applicable.
pH:	9.5 (1% aqueous solution)
SPECIFIC GRAVITY 20°C: (WATER =1)	0.85 – 1.1
SOLUBILITY IN WATER (%)	>10% w/w
COEFFICIENT OF WATER/OIL DIST.:	Not Available
VOC:	None
CHEMICAL FAMILY:	Detergent

MATERIAL SAFETY DATA SHEET

ALCONOX®

SECTION 10 - STABILITY and REACTIVITY

STABILITY: Product is stable

DECOMPOSITION PRODUCTS: When heated to decomposition this product produces Oxides of carbon (COx)

MATERIALS WITH WHICH SUBSTANCE IS INCOMPATIBLE: Strong acids and strong oxidizing agents.

HAZARDOUS POLYMERIZATION: Will not occur.

CONDITIONS TO AVOID: Contact with incompatible materials and dust generation.

SECTION 11 - TOXICOLOGICAL INFORMATION

TOXICITY DATA: Toxicity data is available for mixture:

CAS# 497-19-8 LD50 Oral (Rat)	4090 mg/kg
CAS# 497-19-8 LD50 Oral (Mouse)	6600 mg/kg
CAS# 497-19-8 LC50 Inhalation (Rat)	2300 mg/m ³ 2H
CAS# 497-19-8 LC50 Inhalation (Mouse)	1200 mg/m ³ 2H
CAS# 7758-29-4 LD50 Oral (Rat)	3120 mg/kg
CAS# 7758-29-4 LD50 Oral (Mouse)	3100 mg/kg
CAS# 7722-88-5 LD50 Oral (Rat)	4000 mg/kg

SUSPECTED CANCER AGENT: None of the ingredients are found on the following lists: FEDERAL OSHA Z LIST, NTP, CAL/OSHA, IARC and therefore is not considered to be, nor suspected to be a cancer-causing agent by these agencies.

IRRITANCY OF PRODUCT: Contact with this product can be irritating to exposed skin, eyes and respiratory system.

SENSITIZATION OF PRODUCT: This product is not considered a sensitizer.

REPRODUCTIVE TOXICITY INFORMATION: No information concerning the effects of this product and its components on the human reproductive system.

SECTION 12 - ECOLOGICAL INFORMATION

ALL WORK PRACTICES MUST BE AIMED AT ELIMINATING ENVIRONMENTAL CONTAMINATION.

ENVIRONMENTAL STABILITY: No Data available at this time.

EFFECT OF MATERIAL ON PLANTS or ANIMALS: No evidence is currently available on this product's effects on plants or animals.

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

SECTION 13 - DISPOSAL CONSIDERATIONS

PREPARING WASTES FOR DISPOSAL: Waste disposal must be in accordance with appropriate Federal, State, and local regulations, those of Canada, Australia, EU Member States and Japan.

SECTION 14 - TRANSPORTATION INFORMATION

US DOT; IATA; IMO; ADR:

THIS PRODUCT IS NOT HAZARDOUS AS DEFINED BY 49 CFR 172.101 BY THE U.S. DEPARTMENT OF TRANSPORTATION.

PROPER SHIPPING NAME: Non-Regulated Material

HAZARD CLASS NUMBER and DESCRIPTION: Not Applicable

UN IDENTIFICATION NUMBER: Not Applicable

PACKING GROUP: Not Applicable.

DOT LABEL(S) REQUIRED: Not Applicable

NORTH AMERICAN EMERGENCY RESPONSE GUIDEBOOK NUMBER (2004): Not Applicable

MARINE POLLUTANT: None of the ingredients are classified by the DOT as a Marine Pollutant (as defined by 49 CFR 172.101, Appendix B)

U.S. DEPARTMENT OF TRANSPORTATION (DOT) SHIPPING REGULATIONS:

This product is not classified as dangerous goods, per U.S. DOT regulations, under 49 CFR 172.101.

TRANSPORT CANADA, TRANSPORTATION OF DANGEROUS GOODS REGULATIONS:

This product is not classified as Dangerous Goods, per regulations of Transport Canada.

INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA):

This product is not classified as Dangerous Goods, by rules of IATA:

INTERNATIONAL MARITIME ORGANIZATION (IMO) DESIGNATION:

This product is not classified as Dangerous Goods by the International Maritime Organization.

EUROPEAN AGREEMENT CONCERNING THE INTERNATIONAL CARRIAGE OF DANGEROUS GOODS BY ROAD (ADR):

MATERIAL SAFETY DATA SHEET

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This product is not classified by the United Nations Economic Commission for Europe to be dangerous goods.

SECTION 15 - REGULATORY INFORMATION

UNITED STATES REGULATIONS

SARA REPORTING REQUIREMENTS: This product is not subject to the reporting requirements of Sections 302, 304 and 313 of Title III of the Superfund Amendments and Reauthorization Act., as follows: None

TSCA: All components in this product are listed on the US Toxic Substances Control Act (TSCA) inventory of chemicals.

SARA 311/312:

Acute Health: Yes Chronic Health: No Fire: No Reactivity: No

U.S. SARA THRESHOLD PLANNING QUANTITY: There are no specific Threshold Planning Quantities for this product. The default Federal MSDS submission and inventory requirement filing threshold of 10,000 lb (4,540 kg) may apply, per 40 CFR 370.20.

U.S. CERCLA REPORTABLE QUANTITY (RQ): None

CALIFORNIA SAFE DRINKING WATER AND TOXIC ENFORCEMENT ACT (PROPOSITION 65): None of the ingredients are on the California Proposition 65 lists.

CANADIAN REGULATIONS:

CANADIAN DSL/NDL INVENTORY STATUS: All of the components of this product are on the DSL Inventory

CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) PRIORITIES SUBSTANCES LISTS: No component of this product is on the CEPA First Priorities Substance Lists.

CANADIAN WHMIS CLASSIFICATION and SYMBOLS: This product is categorized as a Controlled Product, Hazard Class D2B as per the Controlled Product Regulations

EUROPEAN ECONOMIC COMMUNITY INFORMATION:

EU LABELING AND CLASSIFICATION:

Classification of the mixture according to Regulation (EC) No1272/2008. See section 2 for details.

AUSTRALIAN INFORMATION FOR PRODUCT:

AUSTRALIAN INVENTORY OF CHEMICAL SUBSTANCES (AICS) STATUS: All components of this product are listed on the AICS.

STANDARD FOR THE UNIFORM SCHEDULING OF DRUGS AND POISONS: Not applicable.

JAPANESE INFORMATION FOR PRODUCT:

JAPANESE MINISTER OF INTERNATIONAL TRADE AND INDUSTRY (MITI) STATUS: The components of this product are not listed as Class I Specified Chemical Substances, Class II Specified Chemical Substances, or Designated Chemical Substances by the Japanese MITI.

INTERNATIONAL CHEMICAL INVENTORIES:

Listing of the components on individual country Chemical Inventories is as follows:

Asia-Pac:	Listed
Australian Inventory of Chemical Substances (AICS):	Listed
Korean Existing Chemicals List (ECL):	Listed
Japanese Existing National Inventory of Chemical Substances (ENCS):	Listed
Philippines Inventory of Chemicals and Chemical Substances (PICCS):	Listed
Swiss Giftliste List of Toxic Substances:	Listed
U.S. TSCA:	Listed

SECTION 16 - OTHER INFORMATION

PREPARED BY: Paul Eigbrett Global Safety Management, 10006 Cross Creek Blvd. Suite 440, Tampa, FL 33647

MATERIAL SAFETY DATA SHEET

ALCONOX®

Disclaimer: To the best of Alconox, Inc. knowledge, the information contained herein is reliable and accurate as of this date; however, accuracy, suitability or completeness is not guaranteed and no warranties of any type either express or implied are provided. The information contained herein relates only to this specific product.

ANNEX:

IDENTIFIED USES OF ALCONOX® AND DIRECTIONS FOR USE

Used to clean: Healthcare instruments, laboratory ware, vacuum equipment, tissue culture ware, personal protective equipment, sampling apparatus, catheters, tubing, pipes, radioactive contaminated articles, optical parts, electronic components, pharmaceutical apparatus, cosmetics manufacturing equipment, metal castings, forgings and stampings, industrial parts, tanks and reactors. Authorized by USDA for use in federally inspected meat and poultry plants. Passes inhibitory residue test for water analysis. FDA certified.

Used to remove: Soil, grit, grime, buffing compound, slime, grease, oils, blood, tissue, salts, deposits, particulates, solvents, chemicals, radioisotopes, radioactive contaminations, silicon oils, mold release agents.

Surfaces cleaned: Corrosion inhibited formulation recommended for glass, metal, stainless steel, porcelain, ceramic, plastic, rubber and fiberglass. Can be used on soft metals such as copper, aluminum, zinc and magnesium if rinsed promptly. Corrosion testing may be advisable.

Cleaning method: Soak, brush, sponge, cloth, ultrasonic, flow through clean-in-place. Will foam—not for spray or machine use.

Directions: Make a fresh 1% solution (2 1/2 Tbsp. per gal., 1 1/4 oz. per gal. or 10 grams per liter) in cold, warm, or hot water. If available use warm water. Use cold water for blood stains. For difficult soils, raise water temperature and use more detergent. Clean by soak, circulate, wipe, or ultrasonic method. Not for spray machines, will foam. For nonabrasive scouring, make paste. Use 2% solution to soak frozen stopcocks. To remove silver tarnish, soak in 1% solution in aluminum container. RINSE THOROUGHLY—preferably with running water. For critical cleaning, do final or all rinsing in distilled, deionized, or purified water. For food contact surfaces, rinse with potable water. Used on a wide range of glass, ceramic, plastic, and metal surfaces. Corrosion testing may be advisable.

Section 1 - Chemical Product and Company Identification

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Material Name: Benzene **CAS Number:** 71-43-2
Chemical Formula: C₆H₆
Structural Chemical Formula: C₆H₆
EINECS Number: 200-753-7
ACX Number: X1001488-9

Synonyms: Benzene; BENZENE; (6)ANNULENE; BENZEEN; BENZEN; BENZIN; BENZINE; BENZOL; BENZOL 90; BENZOLE; BENZOLENE; BENZOLO; BICARBURET OF HYDROGEN; CARBON OIL; COAL NAPHTHA; CYCLOHEXATRIENE; EPA PESTICIDE CHEMICAL CODE 008801; FENZEN; MINERAL NAPHTHA; MOTOR BENZOL; NITRATION BENZENE; PHENE; PHENYL HYDRIDE; POLYSTREAM; PYROBENZOL; PYROBENZOLE

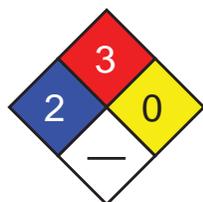
General Use: Manufacture of chemicals including styrene, dyes, and many other organic chemicals. Has been used in artificial leather, linoleum, oil cloth, airplane dopes, lacquers; as solvent for waxes, resins, oils etc. May also be a minor component of gasoline, petrol. Exposure should be minimized by use in closed systems. Handling procedures and control measures should be evaluated for exposure before commencement of use in plant operations.

Section 2 - Composition / Information on Ingredients

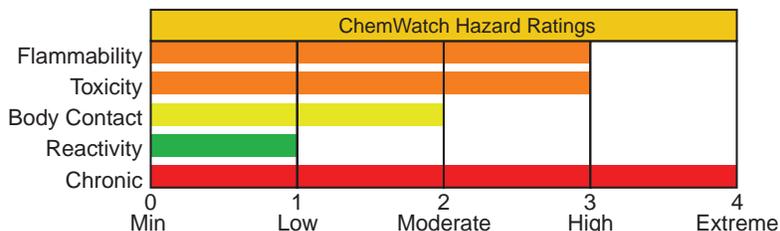
Name	CAS	%
benzene	71-43-2	99.9

OSHA PEL TWA: 1 ppm; STEL: 5 ppm.	NIOSH REL TWA: 0.1 ppm; STEL: 1 ppm.	DFG (Germany) MAK Skin.
ACGIH TLV TWA: 0.5 ppm; STEL: 2.5 ppm; skin.	IDLH Level 500 ppm.	
EU OEL TWA: 1 ppm.		

Section 3 - Hazards Identification



Fire Diamond



HMIS	
3	Health
3	Flammability
0	Reactivity

ANSI Signal Word
Danger!



☆☆☆☆☆ **Emergency Overview** ☆☆☆☆☆

Colorless liquid; sweet odor. Irritating to eyes/skin/respiratory tract. Toxic. Other Acute Effects: headache, dizziness, drowsiness. Absorbed through skin. Chronic Effects: dermatitis, leukemia, bone marrow damage. Carcinogen. Reproductive effects. Flammable.

Potential Health Effects

Target Organs: blood, central nervous system (CNS), bone marrow, eyes, upper respiratory system, skin

Primary Entry Routes: inhalation, skin contact

Acute Effects

Inhalation: The vapor is discomforting to the upper respiratory tract and lungs and may be harmful if inhaled.

If exposure to highly concentrated solvent atmosphere is prolonged this may lead to narcosis, unconsciousness, even coma and possible death.

Acute effects from inhalation of high concentrations of vapor are pulmonary irritation, including coughing, with nausea; central nervous system depression - characterized by headache and dizziness, increased reaction time, fatigue and loss of coordination.

Inhalation hazard is increased at higher temperatures.

The symptoms of acute exposure to high vapor concentrations include confusion, dizziness, tightening of the leg muscles and pressure over the forehead followed by a period of excitement. If exposure continues the casualty quickly becomes stupefied and lapses into a coma with narcosis.

Effects of inhalation may include nausea, vomiting headache, dizziness, drowsiness, weakness, sometimes preceded by brief periods of exhilaration, or euphoria, irritability, malaise, confusion, ataxia, staggering, weak and rapid pulse, chest pain and tightness with breathlessness, pallor, cyanosis of the lips and fingertips and tinnitus. Severe exposures may produce blurred vision, shallow, rapid breathing, delirium, cardiac arrhythmias, unconsciousness, deep anesthesia, paralysis and coma characterized by motor restlessness, tremors and hyperreflexia (occasionally preceded by convulsions). Polyneuritis and persistent nausea, anorexia, muscular weakness, headache, drowsiness, insomnia and agitation may also occur. Two-three weeks after the exposure, nervous irritability, breathlessness and unsteady gait may still persist; cardiac distress and an unusual discoloration of the skin may be evident for up to four weeks. Hemotoxicity is not normally a feature of acute exposures although anemia, thrombocytopenia, petechial hemorrhage, and spontaneous internal bleeding have been reported. Fatal exposures may result from asphyxia, central nervous system depression, cardiac and respiratory failure and circulatory collapse; sudden ventricular fibrillation may also be fatal.

Death may be sudden or may be delayed for 24 hours. Central nervous system, respiratory or hemorrhagic complications may occur up to five days after the exposure and may be lethal; pathological findings include respiratory inflammation with edema, and lung hemorrhage, renal congestion, cerebral edema and extensive petechial hemorrhage in the brain, pleurae, pericardium, urinary tract, mucous membrane and skin.

Exposure to toxic levels has also produced chromosome damage.

Eye: The liquid is highly discomforting to the eyes, may be harmful following absorption and is capable of causing a mild, temporary redness of the conjunctiva (similar to wind-burn), temporary impairment of vision and/or other transient eye damage/ulceration.

The vapor is moderately discomforting to the eyes.

The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

Skin: The liquid may produce skin discomfort following prolonged contact.

Defatting and/or drying of the skin may lead to dermatitis. Open cuts, abraded or irritated skin should not be exposed to this material.

Toxic effects may result from skin absorption.

The material may cause skin irritation after prolonged or repeated exposure and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterized by skin redness (erythema) and swelling (edema) which may progress to vesiculation, scaling and thickening of the epidermis. Histologically there may be intercellular edema of the spongy layer (spongiosis) and intracellular edema of the epidermis.

Ingestion: The liquid is discomforting to the gastrointestinal tract and may be harmful if swallowed.

Ingestion may result in nausea, pain, vomiting. Vomit entering the lungs by aspiration may cause potentially lethal chemical pneumonitis.

Carcinogenicity: NTP - Class 1, Known to be a carcinogen; IARC - Group 1, Carcinogenic to humans; OSHA - Listed as a carcinogen; NIOSH - Listed as carcinogen; ACGIH - Class A2, Suspected human carcinogen; EPA - Class A, Human carcinogen; MAK - Class A1, Capable of inducing malignant tumors as shown by experience with humans.

Chronic Effects: Liquid is an irritant and may cause burning and blistering of skin on prolonged exposure.

Chronic exposure may cause headache, fatigue, loss of appetite and lassitude with incipient blood effects including anemia and blood changes.

Benzene is a myelotoxicant known to suppress bone-marrow cell proliferation and to induce hematologic disorders in humans and animals.

Signs of benzene-induced aplastic anemia include suppression of leukocytes (leukopenia), red cells (anemia), platelets (thrombocytopenia) or all three cell types (pancytopenia). Classic symptoms include weakness, purpura, and hemorrhage. The most significant toxic effect is insidious and often irreversible injury to the blood forming tissue. Leukemia may develop.

Section 4 - First Aid Measures

Inhalation: Remove to fresh air.

Lay patient down. Keep warm and rested.

If breathing is shallow or has stopped, ensure clear airway and apply resuscitation. Transport to hospital or doctor.

Eye Contact: Immediately hold the eyes open and flush continuously for at least 15 minutes with fresh running water. Ensure irrigation under eyelids by occasionally lifting the upper and lower lids.

See
DOT
ERG

Transport to hospital or doctor without delay. Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

Skin Contact: Immediately remove all contaminated clothing, including footwear (after rinsing with water).

Wash affected areas thoroughly with water (and soap if available).

Seek medical attention in event of irritation.

Ingestion: Contact a Poison Control Center.

Do NOT induce vomiting. Give a glass of water.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Note to Physicians: For acute or short-term repeated exposures to petroleum distillates or related hydrocarbons:

1. Primary threat to life from pure petroleum distillate ingestion and/or inhalation is respiratory failure.
2. Patients should be quickly evaluated for signs of respiratory distress (e.g. cyanosis, tachypnea, intercostal retraction, obtundation) and given oxygen. Patients with inadequate tidal volumes or poor arterial blood gases ($pO_2 < 50$ mm Hg or $pCO_2 > 50$ mm Hg) should be intubated.
3. Arrhythmias complicate some hydrocarbon ingestion and/or inhalation and electrocardiographic evidence of myocardial injury has been reported; intravenous lines and cardiac monitors should be established in obviously symptomatic patients. The lungs excrete inhaled solvents, so that hyperventilation improves clearance.
4. A chest x-ray should be taken immediately after stabilization of breathing and circulation to document aspiration and detect the presence of pneumothorax.
5. Epinephrine (adrenalin) is not recommended for treatment of bronchospasm because of potential myocardial sensitization to catecholamines.

Inhaled cardioselective bronchodilators (e.g. Alupent, Salbutamol) are the preferred agents, with aminophylline a second choice.

6. Lavage is indicated in patients who require decontamination; ensure use of cuffed endotracheal tube in adult patients. Consider complete blood count. Evaluate history of exposure.

Section 5 - Fire-Fighting Measures

Flash Point: -11 °C Closed Cup

Autoignition Temperature: 562 °C

LEL: 1.3% v/v

UEL: 7.1% v/v

Extinguishing Media: Foam, dry chemical powder, BCF (where regulations permit), carbon dioxide.

Water spray or fog - Large fires only.

General Fire Hazards/Hazardous Combustion Products: Liquid and vapor are highly flammable.

Severe fire hazard when exposed to heat, flame and/or oxidizers.

Vapor forms an explosive mixture with air.

Severe explosion hazard, in the form of vapor, when exposed to flame or spark. Vapor may travel a considerable distance to source of ignition.

Heating may cause expansion/decomposition with violent rupture of containers.

On combustion, may emit toxic fumes of carbon monoxide (CO).

Fire Incompatibility: Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids, chlorine bleaches, pool chlorine etc. as ignition may result.

Fire-Fighting Instructions: Contact fire department and tell them location and nature of hazard.

May be violently or explosively reactive. Wear full body protective clothing with breathing apparatus. Prevent, by any means available, spillage from entering drains or waterways. Consider evacuation.

Fight fire from a safe distance, with adequate cover.

If safe, switch off electrical equipment until vapor fire hazard removed.

Use water delivered as a fine spray to control fire and cool adjacent area.

Avoid spraying water onto liquid pools.

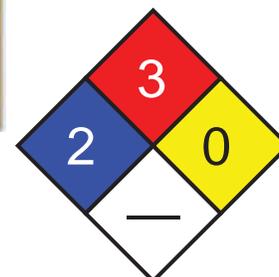
Do not approach containers suspected to be hot.

Cool fire-exposed containers with water spray from a protected location.

If safe to do so, remove containers from path of fire.

Equipment should be thoroughly decontaminated after use.

See
DOT
ERG



Fire Diamond

Section 6 - Accidental Release Measures

Small Spills: Remove all ignition sources. Clean up all spills immediately.

Avoid breathing vapors and contact with skin and eyes.

Control personal contact by using protective equipment.

Contain and absorb small quantities with vermiculite or other absorbent material. Wipe up. Collect residues in a flammable waste container.

Large Spills: Pollutant - contain spillage. Clear area of personnel and move upwind.

Contact fire department and tell them location and nature of hazard.

See
DOT
ERG

May be violently or explosively reactive. Wear breathing apparatus plus protective gloves. Prevent, by any means available, spillage from entering drains or waterways. Consider evacuation.
 No smoking, bare lights or ignition sources. Increase ventilation.
 Stop leak if safe to do so. Water spray or fog may be used to disperse/absorb vapor. Contain spill with sand, earth or vermiculite.
 Use only spark-free shovels and explosion proof equipment.
 Collect recoverable product into labeled containers for recycling.
 Absorb remaining product with sand, earth or vermiculite.
 Collect solid residues and seal in labeled drums for disposal.
 Wash area and prevent runoff into drains.
 If contamination of drains or waterways occurs, advise emergency services.
Regulatory Requirements: Follow applicable OSHA regulations (29 CFR 1910.120).

Section 7 - Handling and Storage

Handling Precautions: Avoid all personal contact, including inhalation.
 Wear protective clothing when risk of exposure occurs.
 Use in a well-ventilated area. Prevent concentration in hollows and sumps.
 DO NOT enter confined spaces until atmosphere has been checked.
 Avoid smoking, bare lights, heat or ignition sources.
 When handling, DO NOT eat, drink or smoke.
 Vapor may ignite on pumping or pouring due to static electricity.
 DO NOT use plastic buckets. Ground and secure metal containers when dispensing or pouring product. Use spark-free tools when handling.
 Avoid contact with incompatible materials.
 Keep containers securely sealed. Avoid physical damage to containers.
 Always wash hands with soap and water after handling.
 Work clothes should be laundered separately.
 Use good occupational work practices. Observe manufacturer's storing and handling recommendations. Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions.
Recommended Storage Methods: Metal can; metal drum. Packing as recommended by manufacturer.
 Check all containers are clearly labeled and free from leaks.
Storage Requirements: Store in original containers in approved flame-proof area.
 No smoking, bare lights, heat or ignition sources.
 DO NOT store in pits, depressions, basements or areas where vapors may be trapped. Keep containers securely sealed.
 Store away from incompatible materials in a cool, dry well ventilated area.
 Protect containers against physical damage and check regularly for leaks.
 Observe manufacturer's storing and handling recommendations.
Regulatory Requirements: Follow applicable OSHA regulations.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: Use in a well-ventilated area. Local exhaust ventilation usually required.
 If risk of overexposure exists, wear NIOSH-approved respirator.
 Correct fit is essential to obtain adequate protection. NIOSH-approved self contained breathing apparatus (SCBA) may be required in some situations.
 Provide adequate ventilation in warehouse or closed storage area.
Personal Protective Clothing/Equipment:
Eyes: Chemical goggles. Full face shield.
 Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them.
Hands/Feet: Nitrile gloves; Neoprene gloves.
 Safety footwear.
 Do NOT use this product to clean the skin.
Respiratory Protection:
 Exposure Range >1 to 10 ppm: Air Purifying, Negative Pressure, Half Mask
 Exposure Range >10 to 100 ppm: Air Purifying, Negative Pressure, Full Face
 Exposure Range >100 to 1000 ppm: Supplied Air, Constant Flow/Pressure Demand, Full Face
 Exposure Range >1000 to unlimited ppm: Self-contained Breathing Apparatus, Pressure Demand, Full Face
 Cartridge Color: black
Note: must change cartridge at beginning of each shift
Other: Overalls. Eyewash unit. Barrier cream. Skin cleansing cream.
Glove Selection Index:
 PE/EVAL/PE Best selection
 PVA Best selection
 TEFLON Best selection

VITON	Best selection
VITON/NEOPRENE	Best selection
NITRILE+PVC	Poor to dangerous choice for other than short-term immersion
BUTYL	Poor to dangerous choice for other than short-term immersion
NITRILE	Poor to dangerous choice for other than short-term immersion
NEOPRENE.....	Poor to dangerous choice for other than short-term immersion
PVC.....	Poor to dangerous choice for other than short-term immersion
NATURAL RUBBER.....	Poor to dangerous choice for other than short-term immersion
BUTYL/NEOPRENE	Poor to dangerous choice for other than short-term immersion

Section 9 - Physical and Chemical Properties

Appearance/General Info: Clear, highly flammable liquid; floats on water. Characteristic aromatic odor. Highly volatile. Mixes with alcohol, chloroform, ether, carbon disulfide, carbon tetrachloride, glacial acetic acid, acetone and oils.

Physical State: Liquid

pH: Not applicable

Odor Threshold: 4.68 ppm

pH (1% Solution): Not applicable.

Vapor Pressure (kPa): 9.95 at 20 °C

Boiling Point: 80.1 °C (176 °F)

Vapor Density (Air=1): 2.77

Freezing/Melting Point: 5.5 °C (41.9 °F)

Formula Weight: 78.12

Volatile Component (% Vol): 100

Specific Gravity (H₂O=1, at 4 °C): 0.879 at 20 °C

Water Solubility: 0.18 g/100 g of water at 25 °C

Evaporation Rate: Fast

Section 10 - Stability and Reactivity

Stability/Polymerization/Conditions to Avoid: Product is considered stable. Hazardous polymerization will not occur.

Storage Incompatibilities: Avoid reaction with oxidizing agents.

Section 11 - Toxicological Information

Toxicity

Oral (man) LD₅₀: 50 mg/kg

Oral (rat) LD₅₀: 930 mg/kg

Inhalation (rat) LC₅₀: 10000 ppm/7h

Inhalation (human) LC₅₀: 2000 ppm/5m

Inhalation (man) TC₅₀: 150 ppm/1y - I

Inhalation (human) TC₅₀: 100 ppm

Reproductive effector in rats

Irritation

Skin (rabbit): 20 mg/24 hr - mod

Eye (rabbit): 2 mg/24 hr - SEVERE

See RTECS CY 1400000, for additional data.

Section 12 - Ecological Information

Environmental Fate: If released to soil, it will be subject to rapid volatilization near the surface and that which does not evaporate will be highly to very highly mobile in the soil and may leach to groundwater. It may be subject to biodegradation based on reported biodegradation of 24% and 47% of the initial 20 ppm in a base-rich para-brownish soil in 1 and 10 weeks, respectively. It may be subject to biodegradation in shallow, aerobic groundwaters, but probably not under anaerobic conditions. If released to water, it will be subject to rapid volatilization; the half-life for evaporation in a wind-wave tank with a moderate wind speed of 7.09 m/sec was 5.23 hours; the estimated half-life for volatilization from a model river one meter deep flowing 1 m/sec with a wind velocity of 3 m/sec is estimated to be 2.7 hours at 20 °C. It will not be expected to significantly adsorb to sediment, bioconcentrate in aquatic organisms or hydrolyze. It may be subject to biodegradation based on a reported biodegradation half-life of 16 days in an aerobic river die-away test. In a marine ecosystem biodegradation occurred in 2 days after an acclimation period of 2 days and 2 weeks in the summer and spring, respectively, whereas no degradation occurred in winter. According to one experiment, it has a half-life of 17 days due to photodegradation which could contribute to removal in situations of cold water, poor nutrients, or other conditions less conducive to microbial degradation. If released to the atmosphere, it will exist predominantly in the vapor phase. Gas-phase will not be subject to direct photolysis but it will react with photochemically produced hydroxyl radicals with a half-life of 13.4 days calculated using an experimental rate constant for the reaction. The reaction time in polluted atmospheres which contain nitrogen oxides or sulfur dioxide is accelerated with the half-life being reported as 4-6 hours. Products of photooxidation include phenol, nitrophenols, nitrobenzene, formic acid, and peroxyacetyl nitrate. It is fairly soluble in water and is removed from the atmosphere in rain.

Ecotoxicity: LC₅₀ Clawed toad (3-4 wk after hatching) 190 mg/l/48 hr /Conditions of bioassay not specified; LC₅₀ Morone saxatilis (bass) 5.8 to 10.9 ppm/96 hr /Conditions of bioassay not specified; LC₅₀ Poecilia reticulata (guppy) 63 ppm/14 days /Conditions of bioassay not specified; LC₅₀ Salmo trutta (brown trout yearlings) 12 mg/l/1 hr (static bioassay); LD₅₀ Lepomis macrochirus (bluegill sunfish) 20 mg/l/24 to 48 hr /Conditions of bioassay not specified; LC₁₀₀ Tetrahymena pyriformis (ciliate) 12.8 mmole/l/24 hr /Conditions of bioassay not specified; LC₅₀ Cancer magister (crab larvae) stage 1, 108 ppm/96 hr /Conditions of bioassay not specified; LC₅₀ Crangon franciscorum (shrimp) 20 ppm/96 hr /Conditions of bioassay not specified

Henry's Law Constant: 5.3 x10⁻³

BCF: eels 3.5

Biochemical Oxygen Demand (BOD): 1.2 lb/lb, 10 days

Octanol/Water Partition Coefficient: log K_{ow} = 2.13

Soil Sorption Partition Coefficient: K_{oc} = woodburn silt loam 31 to 143

Section 13 - Disposal Considerations

Disposal: Consult manufacturer for recycling options and recycle where possible.

Follow applicable federal, state, and local regulations.

Incinerate residue at an approved site.

Recycle containers where possible, or dispose of in an authorized landfill.

Section 14 - Transport Information

DOT Hazardous Materials Table Data (49 CFR 172.101):

Shipping Name and Description: Benzene

ID: UN1114

Hazard Class: 3 - Flammable and combustible liquid

Packing Group: II - Medium Danger

Symbols:

Label Codes: 3 - Flammable Liquid

Special Provisions: IB2, T4, TP1

Packaging: Exceptions: 150 **Non-bulk:** 202 **Bulk:** 242

Quantity Limitations: Passenger aircraft/rail: 5 L **Cargo aircraft only:** 60 L

Vessel Stowage: Location: B **Other:** 40



Section 15 - Regulatory Information

EPA Regulations:

RCRA 40 CFR: Listed U019 Toxic Waste, Ignitable Waste

CERCLA 40 CFR 302.4: Listed per CWA Section 311(b)(4), per RCRA Section 3001, per CWA Section 307(a), per CAA Section 112 10 lb (4.535 kg)

SARA 40 CFR 372.65: Listed

SARA EHS 40 CFR 355: Not listed

TSCA: Listed

Section 16 - Other Information

Disclaimer: Judgments as to the suitability of information herein for the purchaser's purposes are necessarily the purchaser's responsibility. Although reasonable care has been taken in the preparation of such information, Genium Group, Inc. extends no warranties, makes no representations, and assumes no responsibility as to the accuracy or suitability of such information for application to the purchaser's intended purpose or for consequences of its use.

SAFETY DATA SHEET

SECTION 1: Identification of the substance/mixture and of the company/undertaking

1.1 Product identifier

Product name: Crude MCHM

Product No.: EAN 972790. 18717-00, P1871700, P18717EA, P18717ET, P18717YZ

1.2 Relevant identified uses of the substance or mixture and uses advised against

Identified uses: Industrial chemical. gasoline blending

Uses advised against: None known.

1.3 Details of the supplier of the safety data sheet

Manufacturer / Supplier

Eastman Chemical Company
200 South Wilcox Drive
Kingsport, TN 37660-5280 US
+14232292000

Visit our website at www.EASTMAN.com or email emnmsds@eastman.com

1.4 Emergency telephone number:

For emergency health, safety, and environmental information, call 1-423-229-4511 or 1-423-229-2000.

For emergency transportation information, in the United States: call CHEMTREC at 800-424-9300 or call 423-229-2000.

SECTION 2: Hazards identification

WARNING!
HARMFUL IF SWALLOWED
CAUSES SKIN AND EYE IRRITATION
AT ELEVATED TEMPERATURES, VAPOR MAY CAUSE IRRITATION OF EYES AND RESPIRATORY TRACT

SECTION 3: Composition/information on ingredients

3.1 / 3.2 Substances / Mixtures

General information:

Chemical name	Concentration	Additional identification	Notes
4-methylcyclohexanemethanol	68 - 89%	CAS-No.: 34885-03-5 EC No.: 609-038-8	
4-(methoxymethyl)cyclohexanemethanol	4 - 22%	CAS-No.: 98955-27-2	

water	4 - 10%	CAS-No.: 7732-18-5 EC No.: 231-791-2	
methyl 4-methylcyclohexanecarboxylate	5%	CAS-No.: 51181-40-9	
dimethyl 1,4-cyclohexanedicarboxylate	1%	CAS-No.: 94-60-0 EC No.: 202-347-5	
methanol	1%	CAS-No.: 67-56-1 EC No.: 200-659-6 INDEX No.: 603-001-00-X	#
1,4-cyclohexanedimethanol	1 - 2%	CAS-No.: 105-08-8 REACH Registration No.: 01-2119448337-34-0000 01-2119448337-34-0002	#

* All concentrations are percent by weight unless ingredient is a gas. Gas concentrations are in percent by volume.

This substance has workplace exposure limit(s).

PBT: persistent, bioaccumulative and toxic substance.

vPvB: very persistent and very bioaccumulative substance.

SECTION 4: First aid measures

4.1 Description of first aid measures

Inhalation: Treat symptomatically. Move to fresh air. Get medical attention if symptoms persist.

Eye contact: Immediately flush with plenty of water for at least 15 minutes. If easy to do, remove contact lenses. Get medical attention. In case of irritation from airborne exposure, move to fresh air. Get medical attention if symptoms persist.

Skin contact: Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention immediately. Wash contaminated clothing before reuse. Destroy or thoroughly clean contaminated shoes.

Ingestion: Call a physician or poison control center immediately. Only induce vomiting at the instruction of medical personnel. Never give anything by mouth to an unconscious person. Not relevant, due to the form of the product.

4.2 Most important symptoms and effects, both acute and delayed: No data available.

4.3 Indication of any immediate medical attention and special treatment needed

Hazards: No data available.

Treatment: Treat symptomatically.

SECTION 5: Firefighting measures

General fire hazards: None known.

5.1 Extinguishing media

Suitable extinguishing media: Water spray. Dry chemical. Carbon Dioxide. Alcohol foam.

Unsuitable extinguishing media: None known.

5.2 Special hazards arising from the substance or mixture:

None known.

5.3 Advice for firefighters

Special Fire Fighting Procedures: Fight fire from a protected location.

Special protective equipment for fire-fighters: Self-contained breathing apparatus and full protective clothing must be worn in case of fire.

SECTION 6: Accidental release measures

6.1 Personal precautions, protective equipment and emergency procedures: Wear appropriate personal protective equipment.

6.2 Environmental precautions: Avoid release to the environment.

6.3 Methods and material for containment and cleaning up: Absorb spill with vermiculite or other inert material, then place in a container for chemical waste. Large Spillages: Flush spill area with water spray. Prevent runoff from entering drains, sewers, or streams. Dike for later disposal.

Notification Procedures: In the event of a spill or accidental release, notify relevant authorities in accordance with all applicable regulations.

SECTION 7: Handling and storage:

7.1 Precautions for safe handling: Avoid breathing vapor from heated material. Avoid contact with eyes, skin, and clothing. Do not taste or swallow. Use only with adequate ventilation. Wash thoroughly after handling.

7.2 Conditions for safe storage, including any incompatibilities: Keep container closed. Keep away from food, drink and animal feedingstuffs.

7.3 Specific end use(s): Industrial chemical. gasoline blending

SECTION 8: Exposure controls/personal protection**8.1 Control parameters****Occupational exposure limits**

If exposure limits have not been established, maintain airborne levels to an acceptable level.

Chemical name	Type	Exposure Limit values	Source
methanol	TWA	200 ppm	US. ACGIH Threshold Limit Values (01 2010)
	STEL	250 ppm	US. ACGIH Threshold Limit Values (01 2010)
	PEL	200 ppm 260 mg/m ³	US. OSHA Table Z-1 Limits for Air Contaminants (29 CFR 1910.1000) (02 2006)

Biological limit values

Chemical name	Exposure Limit values	Source
methanol (methanol: Sampling time: End of shift.)	15 mg/l (Urine)	ACGIH BEL (01 2010)

8.2 Exposure controls**Appropriate engineering controls:**

Good general ventilation (typically 10 air changes per hour) should be used. Ventilation rates should be matched to conditions. If applicable, use process enclosures, local exhaust ventilation, or other engineering controls to maintain airborne levels below recommended exposure limits. If exposure limits have not been established, maintain airborne levels to an acceptable level.

Individual protection measures, such as personal protective equipment

General information: Eye bath. Safety shower. Washing facilities.

Eye/face protection: Wear safety glasses with side shields (or goggles). Wear a full-face respirator, if needed.

Skin protection

Hand protection: Wear chemical-resistant gloves, footwear, and protective clothing appropriate for the risk of exposure. Contact health and safety professional or manufacturer for specific information.

Other: No data available.

Respiratory Protection: If engineering controls do not maintain airborne concentrations below recommended exposure limits (where applicable) or to an acceptable level (in countries where exposure limits have not been established), an approved respirator must be worn. In the United States of America, if respirators are used, a program should be instituted to assure compliance with OSHA Standard 63 FR 1152, January 8, 1998. Respirator type: Air-purifying respirator with an appropriate, government approved (where applicable), air-purifying filter, cartridge or canister. Contact health and safety professional or manufacturer for specific information.

Hygiene measures: Observe good industrial hygiene practices.

Environmental Controls: No data available.

SECTION 9: Physical and chemical properties

9.1 Information on basic physical and chemical properties

Appearance

Physical State:	Liquid
Form:	Liquid
Color:	Colorless
Odor:	Alcohol
Odor Threshold:	No data available.
pH:	No data available.
Freezing Point:	0 °C
Boiling Point:	180 °C
Flash Point:	112.8 °C (Setaflash Closed Cup)
Evaporation Rate:	No data available.
Flammability (solid, gas):	No data available.
Flammability Limit - Upper (%)-:	No data available.
Flammability Limit - Lower (%)-:	No data available.
Vapor pressure:	No data available.
Vapor density (air=1):	No data available.
Relative density:	< 1 (estimated)
Solubility(ies)	
Solubility in Water:	Appreciable
Solubility (other):	No data available.
Partition coefficient (n-octanol/water):	No data available.
Autoignition Temperature:	No data available.
Decomposition Temperature:	Thermal stability not tested. Low stability hazard expected at normal operating temperatures.
Viscosity:	No data available.
Explosive properties:	No data available.
Oxidizing properties:	No data available.

SECTION 10: Stability and reactivity

10.1 Reactivity:	Materials containing similar structural groups are normally stable.
10.2 Chemical stability:	Not fully evaluated.
10.3 Possibility of hazardous reactions:	None known.
10.4 Conditions to avoid:	Excessive heat.

10.5 Incompatible materials: Strong oxidizing agents.

10.6 Hazardous decomposition products: Carbon Dioxide. Carbon Monoxide.

SECTION 11: Toxicological information

Information on likely routes of exposure

- Inhalation:** At elevated temperatures, vapor may cause irritation of eyes and respiratory tract.
- Ingestion:** Harmful if swallowed.
- Skin contact:** Causes skin irritation.
- Eye contact:** Causes serious eye irritation.

11.1 Information on toxicological effects

Acute Toxicity

Oral

Product: Oral LD-50: (Rat): 825 mg/kg

Dermal

Product: Dermal LD-50: (Rat): > 2,000 mg/kg

Inhalation

Product: No data available.

Specified substance(s)

- 4-methylcyclohexanemethanol No data available.
- 4-(methoxymethyl)cyclohexanemethanol No data available.
- water No data available.
- methyl 4-methylcyclohexanecarboxylate No data available.
- dimethyl 1,4-cyclohexanedicarboxylate No data available.
- methanol No data available.
- 1,4-cyclohexanedimethanol LC50 (Rat, 6 h): > 3 mg/l (highest concentration tested)

Repeated dose toxicity

Product: No data available.

Specified substance(s)

- 4-methylcyclohexanemethanol No data available.
- 4- No data available.

(methoxymethyl)cyclohexanemethanol	
water	No data available.
methyl 4-methylcyclohexanecarboxylate	No data available.
dimethyl 1,4-cyclohexanedicarboxylate	No data available.
methanol	No data available.
1,4-cyclohexanedimethanol	NOEL - No Observable Effect Level (Rat, in drinking water, 90 d): 8000 mg/l

Skin corrosion/irritation:

Product: (Rabbit, 24 h): strong

Serious eye damage/eye irritation:

Product: (Rabbit): moderate

Respiratory or skin sensitization:

Product: Skin Sensitization:, (Guinea Pig) - Not a skin sensitizer.

Germ cell mutagenicity

In vitro

Product: No data available.

Specified substance(s)

4-methylcyclohexanemethanol	No data available.
4-(methoxymethyl)cyclohexanemethanol	No data available.
water	No data available.
methyl 4-methylcyclohexanecarboxylate	No data available.
dimethyl 1,4-cyclohexanedicarboxylate	No data available.
methanol	No data available.
1,4-cyclohexanedimethanol	Mutagenicity - Bacterial, : negative +/- activation Mutagenicity - Mammalian, : negative +/- activation Chromosomal abberation, : negative +/- activation

In vivo

Product: No data available.

Specified substance(s)

4-methylcyclohexanemethanol	No data available.
4-(methoxymethyl)cyclohexanemethanol	No data available.
water	No data available.

methyl 4-methylcyclohexanecarboxylate	No data available.
dimethyl 1,4-cyclohexanedicarboxylate	No data available.
methanol	No data available.
1,4-cyclohexanedimethanol	No data available.

Carcinogenicity

Product: No data available.

Specified substance(s)

4-methylcyclohexanemethanol	No data available.
4-(methoxymethyl)cyclohexanemethanol	No data available.
water	No data available.
methyl 4-methylcyclohexanecarboxylate	No data available.
dimethyl 1,4-cyclohexanedicarboxylate	No data available.
methanol	No data available.
1,4-cyclohexanedimethanol	No data available.

Reproductive toxicity

Product: No data available.

Specified substance(s)

4-methylcyclohexanemethanol	No data available.
4-(methoxymethyl)cyclohexanemethanol	No data available.
water	No data available.
methyl 4-methylcyclohexanecarboxylate	No data available.
dimethyl 1,4-cyclohexanedicarboxylate	No data available.
methanol	No data available.
1,4-cyclohexanedimethanol	No data available.

Specific target organ toxicity - single exposure

Product: No data available.

Specified substance(s)

4-methylcyclohexanemethanol	No data available.
4-(methoxymethyl)cyclohexanemethanol	No data available.

water	No data available.
methyl 4-methylcyclohexanecarboxylate	No data available.
dimethyl 1,4-cyclohexanedicarboxylate	No data available.
methanol	No data available.
1,4-cyclohexanedimethanol	No data available.

Specific target organ toxicity - repeated exposure

Product: No data available.

Specified substance(s)

4-methylcyclohexanemethanol	No data available.
4-(methoxymethyl)cyclohexanemethanol	No data available.
water	No data available.
methyl 4-methylcyclohexanecarboxylate	No data available.
dimethyl 1,4-cyclohexanedicarboxylate	No data available.
methanol	No data available.
1,4-cyclohexanedimethanol	No data available.

Aspiration hazard

Product: No data available.

Specified substance(s)

4-methylcyclohexanemethanol	No data available.
4-(methoxymethyl)cyclohexanemethanol	No data available.
water	No data available.
methyl 4-methylcyclohexanecarboxylate	No data available.
dimethyl 1,4-cyclohexanedicarboxylate	No data available.
methanol	No data available.
1,4-cyclohexanedimethanol	No data available.

Other adverse effects: No data available.

SECTION 12: Ecological information

12.1 Toxicity

Acute toxicity

Fish

Product: LC-50 (Fathead Minnow, 96 h): 57.4 mg/l
 NOEC: (Fathead Minnow, 96 h): 25 mg/l

Aquatic invertebrates

Product: EC-50 (daphnid, 48 h): 98.1 mg/l
 NOEC: (daphnid, 48 h): 40 mg/l

Chronic Toxicity

Fish

Product: No data available.

Specified substance(s)

4- methylcyclohexanemethanol No data available.
 4- (methoxymethyl)cyclohexanemethanol No data available.
 water No data available.
 methyl 4- methylcyclohexanecarboxylate No data available.
 dimethyl 1,4- cyclohexanedicarboxylate No data available.
 methanol No data available.
 1,4-cyclohexanedimethanol No data available.

Aquatic invertebrates

Product: No data available.

Specified substance(s)

4- methylcyclohexanemethanol No data available.
 4- (methoxymethyl)cyclohexanemethanol No data available.
 water No data available.
 methyl 4- methylcyclohexanecarboxylate No data available.
 dimethyl 1,4- cyclohexanedicarboxylate No data available.
 methanol No data available.
 1,4-cyclohexanedimethanol No data available.

Toxicity to Aquatic Plants

Product: No data available.

Specified substance(s)

4- methylcyclohexanemethanol No data available.
 4- (methoxymethyl)cyclohexanemethanol No data available.

emethanol	
water	No data available.
methyl 4-methylcyclohexanecarboxylate	No data available.
dimethyl 1,4-cyclohexanedicarboxylate	No data available.
methanol	No data available.
1,4-cyclohexanedimethanol	EC-50 (Alga, 72 h): > 122.9 mg/l (only concentration tested) NOEC: (Alga, 72 h): >= 122.9 mg/l (only concentration tested)

12.2 Persistence and degradability

Biodegradation

Product: No data available.

Specified substance(s)

4-methylcyclohexanemethanol	No data available.
4-(methoxymethyl)cyclohexanemethanol	No data available.
water	No data available.
methyl 4-methylcyclohexanecarboxylate	No data available.
dimethyl 1,4-cyclohexanedicarboxylate	No data available.
methanol	No data available.
1,4-cyclohexanedimethanol	99.2 % (28 d, Ready Biodegradability: DOC Die Away Test) Readily biodegradable

Biological Oxygen Demand:

Product
 BOD-5: 70 mg/g
 BOD-20: 1,300 mg/g

Chemical Oxygen Demand:

Product 2,450 mg/g

BOD/COD ratio

Product No data available.

Specified substance(s)

4-methylcyclohexanemethanol	No data available.
4-(methoxymethyl)cyclohexanemethanol	No data available.
water	No data available.
methyl 4-methylcyclohexanecarboxylate	No data available.
dimethyl 1,4-cyclohexanedicarboxylate	No data available.
methanol	No data available.

1,4-cyclohexanedimethanol No data available.

12.3 Bioaccumulative potential

Product: No data available.

Specified substance(s)

4- No data available.

methylcyclohexanemethanol No data available.

4- No data available.

(methoxymethyl)cyclohexan
emethanol

water No data available.

methyl 4- No data available.

methylcyclohexanecarboxyla
te

dimethyl 1,4- No data available.

cyclohexanedicarboxylate

methanol No data available.

1,4-cyclohexanedimethanol No data available.

12.4 Mobility in soil:

No data available.

Known or predicted distribution to environmental compartments

4-methylcyclohexanemethanol No data available.

4- No data available.

(methoxymethyl)cyclohexanem
ethanol

water No data available.

methyl 4- No data available.

methylcyclohexanecarboxylate

dimethyl 1,4- No data available.

cyclohexanedicarboxylate

methanol No data available.

1,4-cyclohexanedimethanol 0.499 - 1.6 (QSAR model)

12.5 Results of PBT and vPvB assessment:

No data available.

4-methylcyclohexanemethanol No data available.

4- No data available.

(methoxymethyl)cyclohexanem
ethanol

water No data available.

methyl 4- No data available.

methylcyclohexanecarboxylate

dimethyl 1,4- No data available.

cyclohexanedicarboxylate

methanol No data available.

1,4-cyclohexanedimethanol Not fulfilling PBT
(persistent/bioaccumulative/toxic) criteria

12.6 Other adverse effects: No data available.

SECTION 13: Disposal considerations

13.1 Waste treatment methods

General information: No data available.

Disposal Methods: Dispose of waste and residues in accordance with local authority requirements. Mix with compatible chemical which is less flammable and incinerate. Since emptied containers retain product residue, follow label warnings even after container is emptied. Residual vapors may explode on ignition; do not cut, drill, grind, or weld on or near this container.

SECTION 14: Transport information

Important Note: Shipping descriptions may vary based on mode of transport, quantities, package size, and/or origin and destination. Consult your company's Hazardous Materials/Dangerous Goods expert for information specific to your situation.

DOT

Class not regulated

IMDG - International Maritime Dangerous Goods Code

Class not regulated

IATA

Class not regulated

SECTION 15: Regulatory information

15.1 Safety, health and environmental regulations/legislation specific for the substance or mixture:

This product has been classified in accordance with hazard criteria of the Controlled Products Regulations and the MSDS contains all the information required by the Controlled Products Regulations.

WHMIS (Canada) Status: controlled

WHMIS (Canada) Hazard Classification: D/2/B

SARA 311-312 Hazard Classification(s):

immediate (acute) health hazard

US EPCRA (SARA Title III) Section 313 - Toxic Chemical List

METHANOL

OSHA: hazardous**TSCA (US Toxic Substances Control Act):** All components of this product are listed on the TSCA inventory. Any impurities present in this product are exempt from listing.**DSL (Canadian Domestic Substances List) and CEPA (Canadian Environmental Protection Act):** One or more components of this product are not listed on the DSL. In Canada, its use is restricted to research and development purposes only.**MITI (Japanese Handbook of Existing and New Chemical Substances):** One or more components or reactants of this product are not listed in the Handbook. In Japan, its use is restricted to research and development purposes only.**ECL (Korean Toxic Substances Control Act):** One or more components of this product are not listed on the Korean inventory. In Korea, its use is restricted to research and development purposes only.**SECTION 16: Other information****HMIS® Hazard Ratings:** Health - 2, Flammability - 1, Chemical Reactivity - 0

HMIS® rating involves data interpretations that may vary from company to company. They are intended only for rapid, general identification of the magnitude of the specific hazard. To deal adequately with the safe handling of this material, all the information contained in this MSDS must be considered.

Revision Information: Not relevant.**Key literature references and sources for data:** No data available.**Training information:** No data available.**Issue Date:** 08/18/2011**SDS No:****Disclaimer:** This information is provided without warranty. The information is believed to be correct. This information should be used to make an independent determination of the methods to safeguard workers and the environment.

Section 1 - Chemical Product and Company Identification

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Material Name: Hydrochloric Acid

CAS Number: 7647-01-0

Chemical Formula: ClH

Structural Chemical Formula: HCl

EINECS Number: 231-595-7

ACX Number: X1002202-3

Synonyms: 4-D BOWL SANITIZER; ACIDE CHLORHYDRIQUE; ACIDO CLORHIDRICO; ACIDO CLORIDRICO; ANHYDROUS HYDROCHLORIC ACID; ANHYDROUS HYDROGEN CHLORIDE; AQUEOUS HYDROGEN CHLORIDE; BOWL CLEANER; CHLOORWATERSTOF; CHLOROHYDRIC ACID; CHLOROWODOR; CHLORURE D'HYDROGENE; CHLORURE D'HYDROGENE ANHYDRE; CHLORURO DE HIDROGENO; CHLORWASSERSTOFF; CLORURO DE HIDROGENO ANHIDRO; EMULSION BOWL CLEANER; EPA PESTICIDE CHEMICAL CODE 045901; HYDROCHLORIC ACID; HYDROCHLORIC ACID GAS; HYDROCHLORIDE; HYDROGEN CHLORIDE; HYDROGEN CHLORIDE (HCL); HYGEIA CREME MAGIC BOWL CLEANER; MURIATIC ACID; MURIATIC ACID); NOW SOUTH SAFTI-SOL BRAND CONCENTRATED BOWL CLEANSE WITHMAGIC ACTIO; PERCLEEN BOWL AND URINAL CLEANER; SPIRITS OF SALT; VARLEY'S OCEAN BLUE SCENTED TOILET BOWL CLEANER; VARLEY POLY-PAK BOWL CREME; WHITE EMULSION BOWL CLEANER; WUEST BOWL CLEANER SUPER CONCENTRATED

General Use: Hydrogen chloride is used to produce pharmaceutical hydrochlorides; vinyl chloride from acetylene; alkyl chlorides from olefins and arsenious chloride from arsenious oxide; electronic grade for etching semiconductor crystals. Used in the chlorination of rubber; in organic reactions involving isomerization, polymerization and alkylation; as a catalyst and condensing agent; for making chlorine where economical; in the separation of cotton from wool and cotton de-linting; as flux in the babbitt type of metal alloy; etching semi-conductor crystals.

Hydrochloric acid is used for pickling and heavy duty cleaning of metal parts; rust and scale removal. The production of chlorides; neutralizing bases; a laboratory reagent. For hydrolyzing starch and proteins in preparations for food. As a catalyst and solvent in organic synthesis. As "spirits of salts" for cleaning of lime and masonry from new brickwork. As flux or flux component for soldering; manufacture of "killed spirits".

Section 2 - Composition / Information on Ingredients

Name	CAS	%
hydrogen chloride	7647-01-0	> 99.0

OSHA PEL

Ceiling: 5 ppm, 7 mg/m³.

NIOSH REL

Ceiling: 5 ppm (7 mg/m³).

DFG (Germany) MAK

TWA: 5 ppm; PEAK: 5 ppm.

ACGIH TLV

Ceiling: 2 ppm.

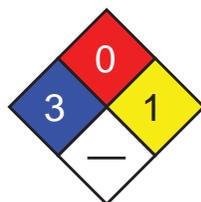
IDLH Level

50 ppm.

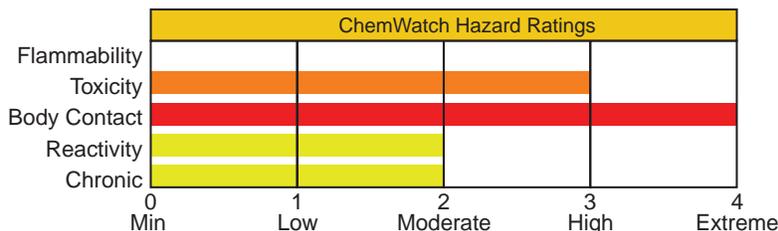
EU OEL

TWA: 5 ppm; STEL: 10 ppm.

Section 3 - Hazards Identification



Fire Diamond



ANSI Signal Word

Danger!

HMIS	
2	Health
0	Flammability
0	Reactivity



☆☆☆☆☆ **Emergency Overview** ☆☆☆☆☆

Colorless gas; characteristic suffocating, pungent odor. Corrosive. Stored as compressed gas which may cause frostbite. Chronic Effects: erosion of teeth.

Potential Health Effects

Target Organs: eyes, skin, respiratory system, liver (in animals)

Primary Entry Routes: inhalation, skin contact, eye contact

Acute Effects

Inhalation: The vapor is extremely discomforting to the upper respiratory tract, may cause severe mucous membrane damage and may be harmful if inhaled.

Inhalation of quantities of liquid mist may be extremely hazardous, even lethal due to spasm, extreme irritation of larynx and bronchi, chemical pneumonitis and pulmonary edema.

A single severe exposure may cause coughing and choking; bleeding of nose, inflammation and occasionally ulceration of the nose, throat and larynx. Fluid on the lungs followed by generalized lung damage may follow. Breathing of vapor may aggravate asthma and inflammatory or fibrotic pulmonary disease.

High concentrations cause necrosis of the tracheal and bronchial epithelium, pulmonary edema, atelectasis and emphysema and damage to the pulmonary blood vessels and liver.

Inhalation hazard is increased at higher temperatures.

The vapor from heated material is extremely discomforting to the upper respiratory tract and lungs if inhaled.

Continued severe exposure can result in pulmonary edema and corrosion of tissues in the nose and throat.

Eye: Hydrogen Chloride: The vapor is extremely discomforting to the eyes and is capable of causing pain and severe conjunctivitis. Corneal injury may develop, with possible permanent impairment of vision, if not promptly and adequately treated.

The material may be irritating to the eye, with prolonged contact causing inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

Hydrochloric Acid: Eye contact is extremely painful and may cause rapid corneal damage. The liquid is extremely corrosive to the eyes and is capable of causing severe damage with loss of sight.

The vapor is highly discomforting and may be corrosive to the eyes. The vapor from heated material is extremely discomforting to the eyes.

Skin: The material is corrosive to the skin and may cause chemical burns.

Toxic effects may result from skin absorption. Bare unprotected skin should not be exposed to this material. The material may accentuate any pre-existing skin condition.

The vapor is discomforting to the skin.

Ingestion: Considered an unlikely route of entry in commercial/industrial environments.

The liquid is extremely corrosive if swallowed and is capable of causing burns to mouth, throat, esophagus, with extreme discomfort, pain and may be fatal if swallowed in quantity. Ingestion may result in nausea, abdominal irritation, pain and vomiting.

Carcinogenicity: NTP - Not listed; IARC - Group 3, Not classifiable as to carcinogenicity to humans; OSHA - Not listed; NIOSH - Not listed; ACGIH - Not listed; EPA - Not listed; MAK - Not listed.

Chronic Effects: Chronic exposure may cause discoloration or erosion of the teeth, bleeding of the nose and gums; and ulceration of the nasal mucous membranes.

Repeated exposures of animals to concentrations of about 34 ppm produced no immediate toxic effects.

Workers exposed to hydrochloric acid suffered from gastritis and a number of cases of chronic bronchitis have also been reported.

Repeated or prolonged exposure to dilute solutions may cause dermatitis. Repeated exposure to low vapor concentrations can cause skin tenderness, bleeding of the nose and gums, chronic bronchitis, gastritis.

Section 4 - First Aid Measures

Inhalation: Remove to fresh air.

Lay patient down. Keep warm and rested.

If breathing is shallow or has stopped, ensure clear airway and apply resuscitation. Transport to hospital or doctor.

Eye Contact: Immediately hold the eyes open and flush continuously for at least 15 minutes with fresh running water. Ensure irrigation under eyelids by occasionally lifting the upper and lower lids.

Transport to hospital or doctor without delay. Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

Skin Contact: Immediately flush body and clothes with large amounts of water, using safety shower if available.

Quickly remove all contaminated clothing, including footwear.

Wash affected areas with water (and soap if available) for at least 15 minutes. Transport to hospital or doctor.

Ingestion: Contact a Poison Control Center. Rinse mouth out with plenty of water. Do NOT induce vomiting. Give a glass of water.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Note to Physicians: For acute or short-term repeated exposures to strong acids:

1. Airway problems may arise from laryngeal edema and inhalation exposure.

Treat with 100% oxygen initially.

2. Respiratory distress may require cricothyroidotomy if endotracheal intubation is contraindicated by excessive swelling.



See
DOT
ERG

3. Intravenous lines should be established immediately in all cases where there is evidence of circulatory compromise.
 4. Strong acids produce a coagulation necrosis characterized by formation of a coagulum (eschar) as a result of the desiccating action of the acid on proteins in specific tissues.

INGESTION:

1. Immediate dilution (milk or water) within 30 minutes post-ingestion is recommended.
2. Do not attempt to neutralize the acid since exothermic reaction may extend the corrosive injury.
3. Be careful to avoid further vomiting since re-exposure of the mucosa to the acid is harmful. Limit fluids to one or two glasses in an adult.
4. Charcoal has no place in acid management.
5. Some authors suggest the use of lavage within 1 hour of ingestion.

SKIN:

1. Skin lesions require copious saline irrigation. Treat chemical burns as thermal burns with non-adherent gauze and wrapping.
2. Deep second-degree burns may benefit from topical silver sulfadiazine.

EYE:

1. Eye injuries require retraction of the eyelids to ensure thorough irrigation of the conjunctival cul-de-sacs. Irrigation should last at least 20-30 minutes. Do not use neutralizing agents or any other additives. Several liters of saline are required.
2. Cycloplegic drops (1% cyclopentolate for short-term use or 5% homatropine for longer term use), antibiotic drops, vasoconstrictive agents, or artificial tears may be indicated dependent on the severity of the injury.
3. Steroid eye drops should only be administered with the approval of a consulting ophthalmologist.

Section 5 - Fire-Fighting Measures

Flash Point: Nonflammable

Autoignition Temperature: Not applicable

LEL: Not applicable

UEL: Not applicable

Extinguishing Media: Water spray or fog; foam;

Bromochlorodifluoromethane (BCF) (where regulations permit); Dry agent; Carbon dioxide.

General Fire Hazards/Hazardous Combustion Products: Noncombustible liquid. Will not burn, but heat produces highly toxic fumes/vapors.

Heating may cause expansion or decomposition leading to violent rupture of containers.

Decomposes on heating and produces toxic fumes of hydrogen chloride. Decomposition may produce toxic fumes of chlorine.

Reacts with metals producing flammable/explosive hydrogen gas. Contact with moisture or water may generate heat causing ignition. Reacts vigorously with alkalis. Moderate fire hazard when in contact with reducing agents.

Fire Incompatibility: Reacts with metals producing flammable/explosive hydrogen gas.

Avoid reactions with metals, metal oxides, hydroxides, amines, carbonates, alkaline materials, acetic anhydride, cyanides, sulphides, sulphites, phosphides, acetylides, borides, carbides, silicides, vinyl acetate, formaldehyde and potassium permanganate, unsaturated organics, metal acetylides, sulphuric acid.

Note: Compatibility with plastics should be confirmed prior to use.

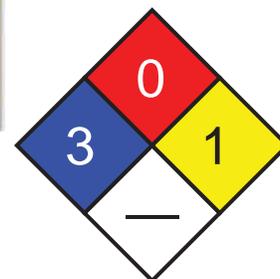
Fire-Fighting Instructions: Contact fire department and tell them location and nature of hazard.

Wear full body protective clothing with breathing apparatus. Prevent, by any means available, spillage from entering drains or waterways. Consider evacuation. Cool fire-exposed containers with water spray from a protected location.

If safe to do so, remove containers from path of fire. Equipment should be thoroughly decontaminated after use.

Water spray or fog may be used to disperse vapor. Do not approach cylinders suspected to be hot. If safe to do so, stop flow of gas.

See
DOT
ERG



Fire Diamond

Section 6 - Accidental Release Measures

Small Spills: DO NOT touch the spill material. Clean up all spills immediately. Wear fully protective PVC clothing and breathing apparatus. Contain and absorb spill with sand, earth, inert material or vermiculite. Use soda ash or slaked lime to neutralize. Collect residues and place in labeled plastic containers with vented lids. Clear area of personnel and move upwind. Avoid breathing vapors and contact with skin and eyes. Do not exert excessive pressure on valve; do not attempt to operate damaged valve. Water spray or fog may be used to disperse vapor.

See
DOT
ERG

Large Spills: Contact fire department and tell them location and nature of hazard. Clear area of personnel and move upwind. Wear full body protective clothing with breathing apparatus. Prevent, by any means available, spillage from entering drains or waterways. Consider evacuation. Stop leak if safe to do so. Remove leaking cylinders to a safe place if possible. Release pressure under safe, controlled conditions by opening the valve. Do not exert excessive pressure on valve; do not attempt to operate damaged valve. Shut off all possible sources of ignition and increase ventilation. Water spray or fog may be used to disperse vapor. Use soda ash or slaked lime to neutralize.

Collect and seal in labeled drums for disposal. Wash spill area with large quantities of water. If contamination of

drains or waterways occurs, advise emergency services. After clean-up operations, decontaminate and launder all protective clothing and equipment before storing and reusing. DO NOT touch the spill material. Contain and absorb spill with sand, earth, inert material or vermiculite.

DO NOT USE WATER OR NEUTRALIZING AGENTS INDISCRIMINATELY ON LARGE SPILLS.

Regulatory Requirements: Follow applicable OSHA regulations (29 CFR 1910.120).

Section 7 - Handling and Storage

Handling Precautions: Avoid generating and breathing mist and vapor, breathing vapors and contact with skin and eyes.

Avoid physical damage to containers. Use in a well-ventilated area. Wear protective clothing and gloves when handling containers. Handle and open container with care.

WARNING: To avoid violent reaction, ALWAYS add material to water and NEVER water to material. When handling, DO NOT eat, drink or smoke. Always wash hands with soap and water after handling. Work clothes should be laundered separately. Use good occupational work practices. Observe manufacturer's storing and handling recommendations.

Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

Local exhaust ventilation may be required for safe working, i.e. to keep exposures below required standards; otherwise, PPE is required.

Keep dry. Reacts violently with water.

Transport containers on a trolley. Avoid sources of heat. DO NOT transfer gas from one cylinder to another.

Recommended Storage Methods: Packaging as recommended by manufacturer. Check that containers are clearly labeled.

Cylinder. Ensure the use of equipment rated for cylinder pressure. Ensure the use of compatible materials of construction. Valve protection cap to be in place until cylinder is secured, connected. Cylinder must be properly secured either in use or in storage. Cylinder valve must be closed when not in use or when empty. Segregate full from empty cylinders. **WARNING:** Suckback into cylinder may result in rupture. Use back-flow preventive device in piping.

Hydrochloric acid: Packs of 2.5 litres or less require a child-resistant closure. Glass container or Plastic carboy or Polylined drum.

Regulatory Requirements: Follow applicable OSHA regulations.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: If risk of overexposure exists, wear air supplied breathing apparatus. Provide adequate ventilation in warehouse or closed storage areas. Use in a well-ventilated area. Local exhaust ventilation may be required for safe working, i. e. , to keep exposures below required standards; otherwise, PPE is required.

If risk of inhalation or overexposure exists, wear NIOSH-approved respirator or work in fume hood. Hydrogen chloride vapors will not be adequately absorbed by organic vapor respirators.

Personal Protective Clothing/Equipment:

Eyes: Chemical goggles. Full face shield.

DO NOT wear contact lenses. Contact lenses pose a special hazard; soft contact lenses may absorb irritants and all lenses concentrate them.

Hands/Feet: Neoprene gloves; rubber gloves. Nitrile gloves.

Safety footwear. Rubber boots.

Hydrochloric acid: Barrier cream and Neoprene gloves or Elbow length PVC gloves. Nitrile gloves.

PVC boots or PVC safety gumboots.

Respiratory Protection:

Exposure Range >5 to <50 ppm: Air Purifying, Negative Pressure, Half Mask

Exposure Range 50 to unlimited ppm: Self-contained Breathing Apparatus, Pressure Demand, Full Face

Cartridge Color: white

Other: Ensure there is ready access to a safety shower; Eyewash unit.

Acid-resistant overalls. Full protective suit. Operators should be trained in procedures for safe use of this material.

Glove Selection Index:

BUTYL Best selection

BUTYL/NEOPRENE Best selection

HYPALON Best selection

NEOPRENE..... Best selection

NEOPRENE/NATURAL..... Best selection

NITRILE+PVC Best selection

PE/EVAL/PE Best selection

SARANEX-23 Best selection

VITON/NEOPRENE Best selection

PVC..... Best selection

NITRILE	Best selection
NATURAL RUBBER.....	Satisfactory; may degrade after 4 hours continuous immersion
NATURAL+NEOPRENE.....	Satisfactory; may degrade after 4 hours continuous immersion
NAT+NEOPR+NITRILE	Poor to dangerous choice for other than short-term immersion

Section 9 - Physical and Chemical Properties

Appearance/General Info: Hydrogen chloride: Colorless, corrosive gas. Pungent suffocating odor. White fumes in moist air. Soluble in methanol, ethanol, ether and benzene.

Hydrochloric acid: Clear to light yellow (orange tint for inhibited grades) fuming corrosive liquid with sharp, suffocating odor.

Physical State: Hydrogen chloride: Compressed gas;

Hydrochloric acid: Liquid

Odor Threshold: 0.26 to 0.3 ppm

Vapor Pressure (kPa): < 24.8 at 25 °C

Vapor Density (Air=1): 1.268 at 20 °C

Formula Weight: 36.461

Specific Gravity (H₂O=1, at 4 °C): < 1.19 at 20 °C

Evaporation Rate: Slow

pH: Hydrochloric acid: < 1

Boiling Point: -85 °C (-121 °F)

Freezing/Melting Point: -114.44 °C (-173.992 °F)

Volatile Component (% Vol): 100

Decomposition Temperature (°C): Not applicable

Water Solubility: 56.1 g/100 cc hot water at 60 °C

Section 10 - Stability and Reactivity

Stability/Polymerization/Conditions to Avoid: Decomposes in the presence of moisture to produce corrosive acid.

May generate sufficient heat to ignite combustible materials. Presence of heat source and direct sunlight (ultra-violet radiation). Product is considered stable under normal handling conditions. Hazardous polymerization will not occur.

Storage Incompatibilities: Hydrogen chloride: Segregate from most common metals and their alloys, alkalis, unsaturated organics, fluorine, metal carbides, metal acetylides, potassium permanganate and sulfuric acid.

Compatibility with plastics should be confirmed prior to use.

Hydrochloric acid: Segregate from alkalies, oxidizing agents and chemicals readily decomposed by acids, i.e.

cyanides, sulfides, carbonates. Avoid storage with metals, metal oxides, hydroxides, amines, carbonates, alkaline materials, acetic anhydride, cyanides, sulphides, sulphites, phosphides, acetylides, borides, carbides, silicides, vinyl acetate, formaldehyde and potassium permanganate. Reacts with zinc, brass, galvanized iron, aluminum, copper and copper alloys.

Section 11 - Toxicological Information

Toxicity

Inhalation (human) LC_{Lo}: 1300 ppm/30 m

Inhalation (human) LC_{Lo}: 3000 ppm/5 m

Inhalation (rat) LC₅₀: 3124 ppm/60 m

Inhalation (rat) LC₅₀: 4701 ppm/30 m

Oral (rat) LD₅₀: 900 mg/kg

Irritation

Eye (rabbit): 5 mg/30 s - mild

See RTECS MW 4025000, for additional data.

Section 12 - Ecological Information

Environmental Fate: No data found.

Ecotoxicity: TL_m Gambusia affinis (mosquito fish) 282 ppm/96 hr (fresh water) /Conditions of bioassay not specified;

Lethal Lepomis macrochirus (bluegill sunfish) 3.6 mg/l/48 hr /Conditions of bioassay not specified; LC₅₀ Cockle 330

to 1,000 mg/l/48 hr /Conditions of bioassay not specified; LC₅₀ Carassius auratus (goldfish) 178 mg/l (1 to 2 hr

survival time) /Conditions of bioassay not specified; LC₅₀ Shore crab 240 mg/l/48 hr /Conditions of bioassay not

specified; LC₅₀ Shrimp 100 to 330 ppm/48 hr (salt water) /Conditions of bioassay not specified; LC₁₀₀ Trout 10 mg/l 24

hr /Conditions of bioassay not specified

Biochemical Oxygen Demand (BOD): none

Section 13 - Disposal Considerations

Disposal: Recycle wherever possible. Consult manufacturer for recycling options. Treat and neutralize at an effluent treatment plant. Bury residue in an authorized landfill. Decontaminate empty containers with a lime slurry. Return empty containers to supplier or bury empty containers at an authorized landfill.

Return empty cylinders to supplier.

Section 14 - Transport Information

DOT Hazardous Materials Table Data (49 CFR 172.101):

Note: This material has multiple possible HMT entries. Choose the appropriate one based on state and condition of specific material when shipped.

Shipping Name and Description: Hydrogen chloride, anhydrous

ID: UN1050

Hazard Class: 2.3 - Poisonous gas

Packing Group:

Symbols:

Label Codes: 2.3 - Poison Gas, 8 - Corrosive

Special Provisions: 3

Packaging: **Exceptions:** None **Non-bulk:** 304 **Bulk:** None

Quantity Limitations: **Passenger aircraft/rail:** Forbidden **Cargo aircraft only:** Forbidden

Vessel Stowage: **Location:** D **Other:** 40



Shipping Name and Description: Hydrochloric acid

ID: UN1789

Hazard Class: 8 - Corrosive material

Packing Group: II - Medium Danger

Symbols:

Label Codes: 8 - Corrosive

Special Provisions: A3, A6, B3, B15, IB2, N41, T8, TP2, TP12

Packaging: **Exceptions:** 154 **Non-bulk:** 202 **Bulk:** 242

Quantity Limitations: **Passenger aircraft/rail:** 1 L **Cargo aircraft only:** 30 L

Vessel Stowage: **Location:** C **Other:**



Shipping Name and Description: Hydrochloric acid

ID: UN1789

Hazard Class: 8 - Corrosive material

Packing Group: III - Minor Danger

Symbols:

Label Codes: 8 - Corrosive

Special Provisions: IB3, T4, TP1, TP12

Packaging: **Exceptions:** 154 **Non-bulk:** 203 **Bulk:** 241

Quantity Limitations: **Passenger aircraft/rail:** 5 L **Cargo aircraft only:** 60 L

Vessel Stowage: **Location:** C **Other:**



Section 15 - Regulatory Information

EPA Regulations:

RCRA 40 CFR: Not listed

CERCLA 40 CFR 302.4: Listed per CWA Section 311(b)(4) 5000 lb (2268 kg)

SARA 40 CFR 372.65: Listed

SARA EHS 40 CFR 355: Listed

RQ: 5000 lb

TPQ: 500 lb

TSCA: Listed

Section 16 - Other Information

Disclaimer: Judgments as to the suitability of information herein for the purchaser's purposes are necessarily the purchaser's responsibility. Although reasonable care has been taken in the preparation of such information, Genium Group, Inc. extends no warranties, makes no representations, and assumes no responsibility as to the accuracy or suitability of such information for application to the purchaser's intended purpose or for consequences of its use.

Section 1 - Chemical Product and Company Identification

61

Material Name: Isobutene

CAS Number: 115-11-7

Chemical Formula: C₄H₈

Structural Chemical Formula: (CH₃)₂C=CH₂

EINECS Number: 204-066-3

ACX Number: X1003822-9

Synonyms: Isobutene; ISOBUTYLENE; ASYM-DIMETHYLETHYLENE; GAMMA-BUTYLENE; 1,1-DIMETHYLETHYLENE; ISO-BUTENE; ISOBUTENE; ISOPROPYLIDENEMETHYLENE; LIQUEFIED PETROLEUM GAS; 2-METHYL-1-PROPENE; 2-METHYLPROPENE; 2-METHYLPROPYLENE; 1-PROPENE,2-METHYL-; PROPENE,2-METHYL-; UNSYM. DIMETHYLETHYLENE

General Use: Production of butene polymers used as adhesives, tackifiers, oil additives.

Butyl rubbers, copolymer resins with butadiene, acrylates and methacrylates.

Also to produce anti-oxidants for foods, food supplements, plastics and in production of isooctane and high-octane aviation gasoline.

Used in closed pressurized systems, fitted with safety relief valve.

Vented gas is flammable, denser than air and will spread. Vent path must not contain ignition sources, pilot lights, bare flames.

Section 2 - Composition / Information on Ingredients

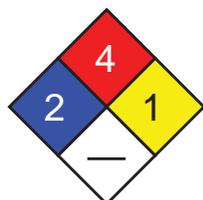
Name	CAS	%
isobutene	115-11-7	>99

OSHA PEL

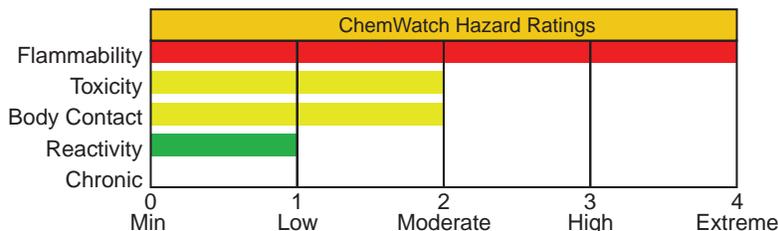
NIOSH REL

ACGIH TLV

Section 3 - Hazards Identification



Fire Diamond



HMIS	
1	Health
4	Flammability
0	Reactivity

ANSI Signal Word

Danger!



Flammable

☆☆☆☆☆ **Emergency Overview** ☆☆☆☆☆

Colorless gas. Acute Effects: Simple asphyxiant which can displace available oxygen; initial symptoms: rapid respiration, air hunger, diminished mental alertness, impaired muscular coordination. Can form explosive mixtures in air. Flammable.

Potential Health Effects

Target Organs: None reported

Primary Entry Routes: inhalation

Acute Effects

Inhalation: The gas is a simple asphyxiant (precludes access to oxygen) and is harmful if exposure is prolonged and inhalation may cause loss of consciousness.

Acute effects from inhalation of high concentrations of gas / vapor are pulmonary irritation, including coughing, with nausea; central nervous system depression - characterized by headache and dizziness, increased reaction time, fatigue and loss of coordination.

If exposure to highly concentrated atmosphere of gas is prolonged this may lead to narcosis, unconsciousness, even coma, and unless resuscitated, death.

Iso-butene is a simple asphyxiant and may have a narcotic action.

Material is highly volatile and may quickly form concentrated atmosphere in confined or unventilated area. Vapor is heavier than air and may displace and replace air in breathing zone, acting as a simple asphyxiant. This may happen with little warning of overexposure.

Hydrocarbons may sensitize the heart to adrenalin and other circulatory catecholamines; as a result cardiac arrhythmias and ventricular fibrillation may occur. Abrupt collapse may produce traumatic injury.

Central nervous system (CNS) depression may be evident early. Symptoms of moderate poisoning may include giddiness, headache, dizziness and nausea.

Serious poisonings may result in respiratory depression and may be fatal.

The paraffin gases C1-4 are practically non-toxic below their lower flammability limits (18000-50000 ppm). Above this level, incidental effects include CNS depression and irritation but these are reversible upon cessation of the exposure. The C3 and iso-C5 hydrocarbons show increasing narcotic properties; branching of the chain also enhances the effect.

The C4 hydrocarbons appear to be more highly neurotoxic than the C3 and C5 members. Several fatalities due to voluntary inhalation of butane have been reported, possibly due to central, respiratory and circulatory effects resulting from anesthesia, laryngeal edema, chemical pneumonia or the combined effects of cardiac toxicity and increased sympathomimetic effects.

Inhalation of petroleum gases may produce narcosis, due in part to olefinic impurities. Displacement of oxygen in the air may cyanosis.

If present in sufficient quantity these gases may reduce the oxygen level to below 18% producing asphyxiation.

Symptoms include rapid respiration, mental dullness, lack of coordination, poor judgement, nausea and vomiting.

The onset of cyanosis may lead to unconsciousness and death.

Eye: The liquid is highly discomforting and may cause severe cold burns and is capable of causing pain and severe conjunctivitis.

Corneal injury may develop, with possible permanent impairment of vision, if not promptly and adequately treated.

The gas is regarded as non-irritating to the eyes.

Skin: Vaporizing liquid causes rapid cooling and contact may cause cold burns, frostbite. The liquid is discomforting to the skin and may rapidly cause severe cold burns.

Bare unprotected skin should not be exposed to this material.

There is no evidence of skin absorption but contact may cause frostbite,

Ingestion: Overexposure is unlikely in this form.

Considered an unlikely route of entry in commercial/industrial environments.

The liquid is highly discomforting if swallowed and may cause severe cold burns.

Carcinogenicity: NTP - Not listed; IARC - Not listed; OSHA - Not listed; NIOSH - Not listed; ACGIH - Not listed; EPA - Not listed; MAK - Not listed.

Chronic Effects: Chronic overexposure may produce dermatitis.

Section 4 - First Aid Measures

Inhalation: Avoid becoming a casualty and remove to fresh air.

Lay patient down. If breathing is shallow or has stopped, ensure clear airway and apply resuscitation.

If available, medical oxygen should be administered by trained personnel.

Transport to hospital or doctor, without delay.

See
DOT
ERG

Eye Contact: Immediately hold the eyes open and flush continuously for at least 15 minutes with fresh running water. Ensure irrigation under eyelids by occasionally lifting the upper and lower lids.

Transport to hospital or doctor without delay. Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

Skin Contact: In case of cold burns (frost-bite): Bathe the affected area immediately in cold water for 10 to 15 minutes, immersing if possible and without rubbing.

Do not apply hot water or radiant heat. Apply a clean, dry dressing.

Transport to hospital or doctor.

Ingestion: Contact a Poison Control Center. DO NOT induce vomiting. Observe the patient carefully. Never give liquid to a person showing signs of being sleepy or with reduced awareness; i.e. becoming unconscious. Give water (or milk) to rinse out mouth. Then provide liquid slowly and as much as casualty can comfortably drink. Transport to hospital or doctor without delay.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Note to Physicians: For acute or short-term repeated exposures to petroleum distillates or related hydrocarbons:

1. Primary threat to life from pure petroleum distillate ingestion and/or inhalation is respiratory failure.

2. Patients should be quickly evaluated for signs of respiratory distress (e.g. cyanosis, tachypnea, intercostal retraction, obtundation) and given oxygen. Patients with inadequate tidal volumes or poor arterial blood gases ($pO_2 < 50$ mm Hg or $pCO_2 > 50$ mm Hg) should be intubated.
3. Arrhythmias complicate some hydrocarbon ingestion and/or inhalation and electrocardiographic evidence of myocardial injury has been reported; intravenous lines and cardiac monitors should be established in obviously symptomatic patients. The lungs excrete inhaled solvents, so that hyperventilation improves clearance.
4. A chest x-ray should be taken immediately after stabilization of breathing and circulation to document aspiration and detect the presence of pneumothorax.
5. Epinephrine (adrenalin) is not recommended for treatment of bronchospasm because of potential myocardial sensitization to catecholamines.
- Inhaled cardioselective bronchodilators (e.g. Alupent, Salbutamol) are the preferred agents, with aminophylline a second choice.
6. Lavage is indicated in patients who require decontamination; ensure use of cuffed endotracheal tube in adult patients.

Section 5 - Fire-Fighting Measures

Flash Point: -76.111 °C

Autoignition Temperature: 465 °C

LEL: 1.8% v/v

UEL: 9.6% v/v

Extinguishing Media: Water spray or fog; dry chemical powder.

Carbon dioxide.

Foam.

General Fire Hazards/Hazardous Combustion Products: Flammable gas. Liquid and vapor are highly flammable.

Dangerous hazard when exposed to heat, flame and oxidizers.

Gas may form explosive mixtures with air over a wide area.

Decomposes on heating and produces toxic fumes of carbon monoxide (CO) and carbon dioxide (CO₂).

Fire Incompatibility: Avoid contamination with oxidizing agents i.e. nitrates, oxidizing acids, chlorine bleaches, pool chlorine etc. as ignition may result.

Fire-Fighting Instructions: Contact fire department and tell them location and nature of hazard.

May be violently or explosively reactive. Wear full body protective clothing with breathing apparatus. Prevent, by any means available, spillage from entering drains or waterways. Consider evacuation.

Do not extinguish burning gas. If safe to do so, stop flow of gas.

If flow of gas cannot be stopped, leave gas to burn.

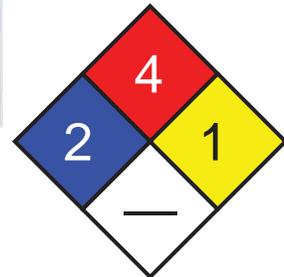
Cool fire-exposed containers with water spray from a protected location.

Do not approach cylinders suspected to be hot.

If safe to do so, remove containers from path of fire.

Fight fire from a safe distance, with adequate cover.

See
DOT
ERG



Fire Diamond

Section 6 - Accidental Release Measures

Small Spills: Avoid breathing vapor and any contact with liquid or gas. Protective equipment including respirator should be used. Do NOT enter confined spaces where gas may have accumulated. Shut off all sources of possible ignition and increase ventilation. Clear area of personnel. Stop leak only if safe to do so. Remove leaking cylinders to safe place. Release pressure under safe controlled conditions by opening valve. Keep area clear of personnel until gas has dispersed.

Large Spills: DO NOT touch the spill material. Shut off all possible sources of ignition and increase ventilation. Restrict access to area. Clear area of personnel and move upwind.

May be violently or explosively reactive. Wear full body protective clothing with breathing apparatus. Prevent, by any means available, spillage from entering drains or waterways. Consider evacuation.

Avoid spraying water onto liquid pools.

Use extreme caution to avoid a violent reaction.

Stop leak if safe to do so.

DO NOT enter confined places where gas may have collected. Remove leaking cylinders to a safe place. Fit vent pipes. Release pressure under safe, controlled conditions by opening valve. Burn issuing gas at vent pipes.

Do not exert excessive pressure on valve; do not attempt to operate damaged valve.

Keep area clear of personnel until gas has dispersed

Regulatory Requirements: Follow applicable OSHA regulations (29 CFR 1910.120).

See
DOT
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Section 7 - Handling and Storage

Handling Precautions: Use good occupational work practices. Use in a well-ventilated area.

Obtain a work permit before attempting any repairs.
 Do not attempt repair work on lines, vessels under pressure.
 Atmospheres must be tested and O.K. before work resumes after leakage.
 Wear protective clothing and gloves when handling containers.
 No smoking, bare lights, heat or ignition sources.
 Use spark-free tools when handling. Ground all lines and equipment.
 Prevent concentration in hollows and sumps. DO NOT enter confined spaces until atmosphere has been checked.
 Gas may travel a considerable distance to source of ignition.
 Vapor may ignite on pumping or pouring due to static electricity.
 Avoid physical damage to containers.
 DO NOT transfer gas from one cylinder to another.
 Natural gases contain a contaminant, radon-222, a naturally occurring radioactive gas. During subsequent processing, radon tends to concentrate in liquified petroleum streams and in product streams having similar boiling points. Industry experience indicates that the commercial product may contain small amounts of radon-222 and its radioactive decay products (radon daughters). The actual concentration of radon-222 and radioactive daughters in process equipment (IE lines, filters, pumps and reactor units) may reach significant levels and produce potentially damaging levels of gamma radiation. A potential external radiation hazard exists at or near any pipe, valve or vessel containing a radon enriched stream or containing internal deposits of radioactive material. Field studies, however, have not shown that conditions exist that expose the worker to cumulative exposures in excess of general population limits. Equipment containing gamma-emitting decay products should be presumed to be internally contaminated with alpha- emitting decay products which may be hazardous if inhaled or ingested.
 During maintenance operations that require the opening of contaminated process equipment, the flow of gas should be stopped and a four hour delay enforced to allow gamma-radiation to drop to background levels. Protective equipment (including high efficiency particulate respirators (P3) suitable for radionucleotides or supplied air) should be worn by personnel entering a vessel or working on contaminated process equipment to prevent skin contamination or inhalation of any residue containing alpha-radiation.
 Airborne contamination may be minimized by handling scale and/or contaminated materials in a wet state.

Recommended Storage Methods: Packaging as recommended by manufacturer.

Check that containers are clearly labeled.
 Cylinder fitted with valve protector cap.
 Ensure the use of equipment rated for cylinder pressure.
 Ensure the use of compatible materials of construction.
 Cylinder valve must be closed when not in use or when empty.
 Cylinder must be properly secured either in use or in storage.
 WARNING: Suckback into cylinder may result in rupture.
 Use back-flow preventive device in piping.

Regulatory Requirements: Follow applicable OSHA regulations.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: Use in a well-ventilated area if gas concentrations are high: or If risk of overexposure exists, wear NIOSH-approved respirator.
 Correct fit is essential to obtain adequate protection.
 Used in closed pressurized systems; fitted with temperature and pressure safety relief valves which are vented to allow safe dispersal.
 Provide adequate ventilation in warehouse or closed storage areas.

Personal Protective Clothing/Equipment:

Eyes: Safety glasses with side shields; or as required, chemical goggles.

Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them.

Hands/Feet: Protective gloves eg. leather gloves or gloves with leather facing. Neoprene rubber gloves.

Safety footwear.

Other: Operators should be trained in correct use & maintenance of respirators Ensure that there is ready access to breathing apparatus.

Protective overalls, closely fitted at neck and wrist. Eye-wash unit.

IN CONFINED SPACES:

1. Non-sparking protective boots.

2. Static-free clothing.

3. Ensure availability of lifeline.

Staff should be trained in all aspects of rescue work.

Ensure there is ready access to an emergency shower.

Section 9 - Physical and Chemical Properties

Appearance/General Info: Easily liquified flammable gas or colorless highly volatile liquid. Packed as liquid under pressure and remains liquid only under pressure. Sudden release of pressure or leakage may result in rapid vaporization with generation of large volume of highly flammable / explosive gas. Strong gasoline odor. Floats and boils on water giving a flammable / explosive, visible cloud. Soluble in alcohol, ether, benzene and sulphuric acid.

Physical State: Liquefied gas

pH: Not applicable

Odor Threshold: 1.3 to 3.0 mg/m³

pH (1% Solution): Not applicable.

Vapor Pressure (kPa): 182 kPa at 10 °C

Boiling Point: -6.9 °C (20 °F)

Vapor Density (Air=1): 2.01

Freezing/Melting Point: -140.35 °C (-220.63 °F)

Formula Weight: 56.11

Volatile Component (% Vol): 100

Specific Gravity (H₂O=1, at 4 °C): 0.59

Water Solubility: Practically insoluble in water

Evaporation Rate: Very rapid

Section 10 - Stability and Reactivity

Stability/Polymerization/Conditions to Avoid: Product is considered stable. Hazardous polymerization will not occur.

Storage Incompatibilities: Avoid contact with oxidizing agents.

The interaction of alkenes and alkynes with nitrogen oxides and oxygen may produce explosive addition products; these may form at very low temperatures and explode on heating to higher temperatures (the addition products from 1,3-butadiene and cyclopentadiene form rapidly at -150 °C and ignite or explode on warming to -35 to -15 C). These derivatives ("pseudo- nitrosites") were formerly used to characterize terpene hydrocarbons.

Exposure to air must be kept to a minimum so as to limit the build-up of peroxides which will concentrate in bottoms if the product is distilled.

The product must not be distilled to dryness if the peroxide concentration is substantially above 10 ppm (as active oxygen) since explosive decomposition may occur. Distillate must be immediately inhibited to prevent peroxide formation. The effectiveness of the antioxidant is limited once the peroxide levels exceed 10 ppm as active oxygen. Addition of more inhibitor at this point is generally ineffective.

Prior to distillation it is recommended that the product should be washed with aqueous ferrous ammonium sulfate to destroy peroxides; the washed product should be immediately re-inhibited.

A range of exothermic decomposition energies for double bonds is given as 40-90 kJ/mol. The relationship between energy of decomposition and processing hazards has been the subject of discussion; it is suggested that values of energy released per unit of mass, rather than on a molar basis (J/g) be used in the assessment. For example, in "open vessel processes" (with man-hole size openings, in an industrial setting), substances with exothermic decomposition energies below 500 J/g are unlikely to present a danger, whilst those in "closed vessel processes" (opening is a safety valve or bursting disk) present some danger where the decomposition energy exceeds 150 J/g.

Avoid reactions with oxidizing agents, organic acids, inorganic acids halogenated compounds, polymerizable esters, oxygen, cyanohydrins and molten sulphur.

Section 11 - Toxicological Information

Toxicity

Inhalation (rat) LC₅₀: 620000 mg/m³/4h

Irritation

Nil reported

See RTECS UD 0890000, for additional data.

Section 12 - Ecological Information

Environmental Fate: No data found.

Ecotoxicity: No data found.

BCF: no food chain concentration potential

Biochemical Oxygen Demand (BOD): none

Section 13 - Disposal Considerations

Disposal: Consult manufacturer for recycling options.

Discharge to burning flare. Return empty cylinders to supplier.

Section 14 - Transport Information

DOT Hazardous Materials Table Data (49 CFR 172.101):

Note: This material has multiple possible HMT entries. Choose the appropriate one based on state and condition of specific material when shipped.

Shipping Name and Description: Isobutylene *see also* Petroleum gases, liquefied

ID: UN1055

Hazard Class: 2.1 - Flammable gas

Packing Group:

Symbols:

Label Codes: 2.1 - Flammable Gas

Special Provisions: 19, T50

Packaging: **Exceptions:** 306 **Non-bulk:** 304 **Bulk:** 314, 315

Quantity Limitations: **Passenger aircraft/rail:** Forbidden

Cargo aircraft only: 150 kg

Vessel Stowage: **Location:** E **Other:** 40



Shipping Name and Description: Petroleum gases, liquefied *or* Liquefied petroleum gas

ID: UN1075

Hazard Class: 2.1 - Flammable gas

Packing Group:

Symbols:

Label Codes: 2.1 - Flammable Gas

Special Provisions: T50

Packaging: **Exceptions:** 306 **Non-bulk:** 304 **Bulk:** 314, 315

Quantity Limitations: **Passenger aircraft/rail:** Forbidden

Cargo aircraft only: 150 kg

Vessel Stowage: **Location:** E **Other:**



Section 15 - Regulatory Information

EPA Regulations:

RCRA 40 CFR: Not listed

CERCLA 40 CFR 302.4: Not listed

SARA 40 CFR 372.65: Not listed

SARA EHS 40 CFR 355: Not listed

TSCA: Listed

Section 16 - Other Information

Disclaimer: Judgments as to the suitability of information herein for the purchaser's purposes are necessarily the purchaser's responsibility. Although reasonable care has been taken in the preparation of such information, Genium Group, Inc. extends no warranties, makes no representations, and assumes no responsibility as to the accuracy or suitability of such information for application to the purchaser's intended purpose or for consequences of its use.

Section 1 - Chemical Product and Company Identification

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Material Name: Nitric Acid **CAS Number:** 7697-37-2
Chemical Formula: HNO₃
Structural Chemical Formula: HNO₃
EINECS Number: 231-714-2
ACX Number: X1002177-5
Synonyms: ACIDE NITRIQUE; ACIDO NITRICO; AQUA FORTIS; AZOTIC ACID; AZOTOWY KWAS; ENGRAVER'S ACID; ENGRAVERS ACID; HYDROGEN NITRATE; KYSELINA DUSICNE; NITAL; NITRIC ACID; NITRIC ACID OTHER THAN RED FUMING WITH >70% NITRIC ACID; NITRIC ACID OTHER THAN RED FUMING WITH NOT >70% NITRICACID; NITROUS FUMES; NITRYL HYDROXIDE; RED FUMING NITRIC ACID (RFNA); SALPETERSAURE; SALPETERZUUROPLOSSINGEN; WHITE FUMING NITRIC ACID (WFNA)
General Use: Manufacture of organic and inorganic nitrates and nitro compounds for fertilizers, dye intermediates and many organic chemicals.
 Used for etching and cleaning metals.
 Operators should be trained in procedures for safe use of this material.

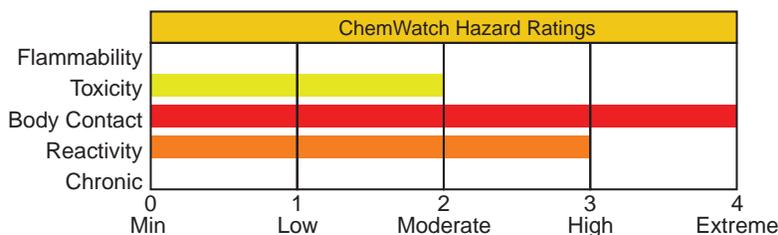
Section 2 - Composition / Information on Ingredients

Name	CAS	%
nitric acid	7697-37-2	>95
OSHA PEL TWA: 2 ppm; 5 mg/m ³ .	NIOSH REL TWA: 2 ppm (5 mg/m ³); STEL: 4 ppm (10 mg/m ³).	DFG (Germany) MAK TWA: 2 ppm; PEAK: 2 ppm.
ACGIH TLV TWA: 2 ppm; STEL: 4 ppm.	IDLH Level 25 ppm.	
EU OEL STEL: 2.6 mg/m ³ (1 ppm).		

Section 3 - Hazards Identification



Fire Diamond



HMIS	
3	Health
0	Flammability
2	Reactivity

ANSI Signal Word

Danger!



☆☆☆☆☆ **Emergency Overview** ☆☆☆☆☆

Clear to yellow fuming liquid; acrid, suffocating odor. Corrosive. Other Acute Effects: lung damage. Chronic Effects: tooth erosion, bronchitis. Strong oxidizer.

Potential Health Effects

Target Organs: eyes, skin, respiratory system, teeth

Primary Entry Routes: inhalation, ingestion, skin contact, eye contact

Acute Effects

Inhalation: The vapor is extremely discomforting and corrosive to the upper respiratory tract and lungs and the material presents a hazard from a single acute exposure or from repeated exposures over long periods.

Inhalation hazard is increased at higher temperatures.

Reactions may occur following a single acute exposure or may only appear after repeated exposures.

Reactions may not occur on exposure but response may be delayed with symptoms only appearing many hours later. The material may produce respiratory tract irritation which produces an inflammatory response involving the recruitment and activation of many cell types, mainly derived from the vascular system. Unlike most organs the lung can respond to a chemical insult or agent by first trying to remove or neutralize the irritant and then repairing the damage. The repair process, which initially developed to protect mammalian lungs from foreign matter and antigens, may however, cause further damage the lungs when activated by hazardous chemicals. The result is often the impairment of gas exchange, the primary function of the lungs.

Inhalation of nitric acid mist or fumes at 2 to 25 ppm over an 8 hour period may cause pulmonary irritation and symptoms of lung damage.

Only several minutes of exposure to concentrated atmosphere i.e. 200 ppm may cause severe pulmonary damage and even fatality. Death may be delayed for several days.

Exposure to nitric acid fumes (with concurrent inhalation of nitrogen dioxide and nitric oxide) may elicit prompt irritation of the upper respiratory tract leading to coughing, gagging, chest pain, dyspnea, cyanosis if concentrations are sufficiently high and duration of exposure sufficiently long, pulmonary edema.

Eye: The liquid is extremely corrosive to the eyes and contact may cause rapid tissue destruction and is capable of causing severe damage with loss of sight.

The vapor is extremely discomforting to the eyes and is capable of causing pain and severe conjunctivitis.

Corneal injury may develop, with possible permanent impairment of vision, if not promptly and adequately treated.

The material may produce moderate eye irritation leading to inflammation.

Repeated or prolonged exposure to irritants may produce conjunctivitis.

Eye contact with concentrated acid may give no pain, whilst diluted solution causes intense pain and both can cause permanent eye damage or blindness. Burns may result in shrinkage of the eyeball, symblepharon (adhesions between tarsal and bulbar conjunctivae), permanent corneal opacification, and visual impairment leading to blindness.

Skin: The liquid is extremely corrosive to the skin and contact may cause tissue destruction with severe burns.

Bare unprotected skin should not be exposed to this material.

The vapor is highly discomforting to the skin.

The material may cause skin irritation after prolonged or repeated exposure and may produce a contact dermatitis (nonallergic). This form of dermatitis is often characterized by skin redness (erythema) and swelling (edema) which may progress to vesiculation, scaling and thickening of the epidermis. Histologically there may be intercellular edema of the spongy layer (spongiosis) and intracellular edema of the epidermis.

Skin contact causes yellow discoloration of the skin, blisters and scars that may not heal. The skin may be stained bright-yellow or yellowish brown due to the formation of xanthoproteic acid. Dilute solutions may harden the epithelium without producing overt corrosion.

Ingestion: Considered an unlikely route of entry in commercial/industrial environments.

The material is extremely corrosive if swallowed and is capable of causing burns to mouth, throat, esophagus, with extreme discomfort, pain and may be fatal.

Even a small amount causes severe corrosion of the stomach, burning pain, vomiting and shock, possibly causing non-healing scarring of the gastrointestinal tract and stomach. Death may be delayed 12 hours to 14 days or to several months. Such late fatalities are attributed to a chemical lobular pneumonitis secondary to aspiration. Survivors show stricture of the gastric mucosa and subsequent pernicious anemia.

Carcinogenicity: NTP - Not listed; IARC - Not listed; OSHA - Not listed; NIOSH - Not listed; ACGIH - Not listed; EPA - Not listed; MAK - Not listed.

Chronic Effects: Prolonged or repeated overexposure to low concentrations of vapor may cause chronic bronchitis, corrosion of teeth, even chemical pneumonitis.

Section 4 - First Aid Measures

Inhalation: Remove to fresh air.

Lay patient down. Keep warm and rested.

If available, administer medical oxygen by trained personnel.

If breathing is shallow or has stopped, ensure clear airway and apply resuscitation. Transport to hospital or doctor, without delay.

Eye Contact: Immediately hold the eyes open and flush continuously for at least 15 minutes with fresh running water. Ensure irrigation under eyelids by occasionally lifting the upper and lower lids.

Transport to hospital or doctor without delay. Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

Immediately transport to hospital or doctor. DO NOT delay.

Skin Contact: Immediately flush body and clothes with large amounts of water, using safety shower if available.

Quickly remove all contaminated clothing, including footwear.

Wash affected areas with water (and soap if available) for at least 15 minutes. Transport to hospital or doctor. DO NOT delay.

Ingestion: Contact a Poison Control Center.

Do NOT induce vomiting. Give a glass of water.

Immediately transport to hospital or doctor. DO NOT delay.

See
DOT
ERG

After first aid, get appropriate in-plant, paramedic, or community medical support.

Note to Physicians: For acute or short-term repeated exposures to strong acids:

1. Airway problems may arise from laryngeal edema and inhalation exposure. Treat with 100% oxygen initially.
2. Respiratory distress may require cricothyroidotomy if endotracheal intubation is contraindicated by excessive swelling.
3. Intravenous lines should be established immediately in all cases where there is evidence of circulatory compromise.
4. Strong acids produce a coagulation necrosis characterized by formation of a coagulum (eschar) as a result of the desiccating action of the acid on proteins in specific tissues.

INGESTION:

1. Immediate dilution (milk or water) within 30 minutes post-ingestion is recommended.
2. Do not attempt to neutralize the acid since exothermic reaction may extend the corrosive injury.
3. Be careful to avoid further vomiting since re-exposure of the mucosa to the acid is harmful. Limit fluids to one or two glasses in an adult.
4. Charcoal has no place in acid management.
5. Some authors suggest the use of lavage within 1 hour of ingestion.

SKIN:

1. Skin lesions require copious saline irrigation. Treat chemical burns as thermal burns with non-adherent gauze and wrapping.
2. Deep second-degree burns may benefit from topical silver sulfadiazine.

EYE:

1. Eye injuries require retraction of the eyelids to ensure thorough irrigation of the conjunctival cul-de-sacs. Irrigation should last at least 20-30 minutes. Do not use neutralizing agents or any other additives. Several liters of saline are required.
2. Cycloplegic drops (1% cyclopentolate for short-term use or 5% homatropine for longer term use), antibiotic drops, vasoconstrictive agents, or artificial tears may be indicated dependent on the severity of the injury.
3. Steroid eye drops should only be administered with the approval of a consulting ophthalmologist.

Section 5 - Fire-Fighting Measures

Flash Point: Nonflammable

Autoignition Temperature: Not applicable

LEL: Not applicable

UEL: Not applicable

Extinguishing Media: Water spray or fog; foam, dry chemical powder, or BCF (where regulations permit).
Carbon dioxide.

General Fire Hazards/Hazardous Combustion Products: Will not burn but increases intensity of fire.

Heating may cause expansion or decomposition leading to violent rupture of containers.

Heat affected containers remain hazardous.

Contact with combustibles such as wood, paper, oil or finely divided metal may cause ignition, combustion or violent decomposition.

May emit irritating, poisonous or corrosive fumes.

Decomposes on heating and produces toxic fumes of nitrogen oxides (NO_x) and nitric acid.

Fire Incompatibility: Oxidizing agents as a class are not necessarily combustible themselves, but can increase the risk and intensity of fire in many other substances.

Reacts vigorously with water and alkali.

Avoid reaction with organic materials/compounds, powdered metals, reducing agents and hydrogen sulfide (H₂S) as ignition may result.

Reacts with metals producing flammable/explosive hydrogen gas.

Fire-Fighting Instructions: Contact fire department and tell them location and nature of hazard.

May be violently or explosively reactive. Wear full body protective clothing with breathing apparatus. Prevent, by any means available, spillage from entering drains or waterways. Consider evacuation.

Fight fire from a safe distance, with adequate cover.

Extinguishers should be used only by trained personnel.

Use water delivered as a fine spray to control fire and cool adjacent area.

Avoid spraying water onto liquid pools.

Do not approach containers suspected to be hot.

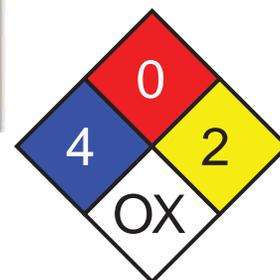
Cool fire-exposed containers with water spray from a protected location.

If safe to do so, remove containers from path of fire.

If fire gets out of control withdraw personnel and warn against entry.

Equipment should be thoroughly decontaminated after use.

See
DOT
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Fire Diamond

Section 6 - Accidental Release Measures

Small Spills: Dangerous levels of nitrogen oxides may form during spills of nitric acid.

Wear fully protective PVC clothing and breathing apparatus.

Clean up all spills immediately. No smoking, bare lights, ignition sources.

Avoid all contact with any organic matter including fuel, solvents, sawdust, paper or cloth and other incompatible materials, as ignition may result.

Avoid breathing dust or vapors and all contact with skin and eyes.

Control personal contact by using protective equipment.

Contain and absorb spill with dry sand, earth, inert material or vermiculite. DO NOT use sawdust as fire may result.

Scoop up solid residues and seal in labeled drums for disposal.

Neutralize/decontaminate area.

Use soda ash or slaked lime to neutralize.

Large Spills: DO NOT touch the spill material. Restrict access to area.

Clear area of personnel and move upwind. Contact fire department and tell them location and nature of hazard.

May be violently or explosively reactive. Wear full body protective clothing with breathing apparatus. Prevent, by any means available, spillage from entering drains or waterways. Consider evacuation.

No smoking, flames or ignition sources. Increase ventilation.

Contain spill with sand, earth or other clean, inert materials.

NEVER use organic absorbents such as sawdust, paper, cloth; as fire may result. Avoid any contamination by organic matter.

Use spark-free and explosion-proof equipment.

Collect any recoverable product into labeled containers for possible recycling. DO NOT mix fresh with recovered material.

Collect residues and seal in labeled drums for disposal.

Wash area and prevent runoff into drains. Decontaminate equipment and launder all protective clothing before storage and reuse.

If contamination of drains or waterways occurs advise emergency services.

DO NOT USE WATER OR NEUTRALIZING AGENTS INDISCRIMINATELY ON LARGE SPILLS.

Regulatory Requirements: Follow applicable OSHA regulations (29 CFR 1910.120).



Section 7 - Handling and Storage

Handling Precautions: Avoid generating and breathing mist. Do not allow clothing wet with material to stay in contact with skin.

Avoid all personal contact, including inhalation.

Wear protective clothing when risk of exposure occurs.

Use in a well-ventilated area.

WARNING: To avoid violent reaction, ALWAYS add material to water and NEVER water to material.

Avoid smoking, bare lights or ignition sources.

Avoid contact with incompatible materials.

When handling, DO NOT eat, drink or smoke.

Keep containers securely sealed when not in use. Avoid physical damage to containers. Always wash hands with soap and water after handling. Work clothes should be laundered separately.

Launder contaminated clothing before reuse.

Use good occupational work practices. Observe manufacturer's storing and handling recommendations. Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

Recommended Storage Methods: Stainless steel drum. Check that containers are clearly labeled.

Packaging as recommended by manufacturer.

Regulatory Requirements: Follow applicable OSHA regulations.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: Use in a well-ventilated area.

Local exhaust ventilation may be required for safe working, i. e. , to keep exposures below required standards; otherwise, PPE is required.

If risk of overexposure exists, wear NIOSH-approved respirator.

Correct fit is essential to obtain adequate protection.

In confined spaces where there is inadequate ventilation, wear full-face air supplied breathing apparatus.

Personal Protective Clothing/Equipment:

Eyes: Chemical goggles. Full face shield.

DO NOT wear contact lenses. Contact lenses pose a special hazard; soft contact lenses may absorb irritants and all lenses concentrate them.

Hands/Feet: Bare unprotected skin should not be exposed to this material. Impervious, gauntlet length gloves i.e., butyl rubber gloves or Neoprene rubber gloves or wear chemical protective gloves, e.g. PVC.

Wear safety footwear or safety gumboots, e.g. Rubber.

Respiratory Protection:

Exposure Range >2 to <25 ppm: Supplied Air, Constant Flow/Pressure Demand, Half Mask

Exposure Range 25 to unlimited ppm: Self-contained Breathing Apparatus, Pressure Demand, Full Face

Other: Operators should be trained in procedures for safe use of this material.

Acid-resistant overalls or Rubber apron or PVC apron.

Ensure there is ready access to an emergency shower.

Ensure that there is ready access to eye wash unit.

Ensure that there is ready access to breathing apparatus.

Glove Selection Index:

BUTYL Best selection

HYPALON Best selection

NEOPRENE..... Best selection

NEOPRENE/NATURAL..... Best selection

PE/EVAL/PE Best selection

SARANEX-23 Best selection

NATURAL RUBBER..... Satisfactory; may degrade after 4 hours continuous immersion

NATURAL+NEOPRENE..... Satisfactory; may degrade after 4 hours continuous immersion

PVC..... Poor to dangerous choice for other than short-term immersion

NITRILE+PVC Poor to dangerous choice for other than short-term immersion

Section 9 - Physical and Chemical Properties

Appearance/General Info: Clear, colorless to slightly yellow liquid. Sharp strong odor.

CAUTION: exothermic dilution hazard.

HIGHLY CORROSIVE. Corrosive to most metals. Powerful oxidizing agent.

Darkens to brownish color on aging and exposure to light.

Physical State: Liquid

Odor Threshold: 0.75 to 2.50 mg/m³

Vapor Pressure (kPa): 8.26

Vapor Density (Air=1): 1.5

Formula Weight: 63.02

Specific Gravity (H₂O=1, at 4 °C): 1.3-1.42

pH: < 1

pH (1% Solution): 1

Boiling Point: 83 °C (181 °F) at 760 mm Hg

Freezing/Melting Point: -42 °C (-43.6 °F)

Volatile Component (% Vol): 100 (nominal)

Decomposition Temperature (°C): Not applicable

Water Solubility: Soluble in all proportions

Section 10 - Stability and Reactivity

Stability/Polymerization/Conditions to Avoid: Presence of heat source and direct sunlight. Storage in unsealed containers. Hazardous polymerization will not occur.

Storage Incompatibilities: Segregate from reducing agents, finely divided combustible materials, combustible materials, sawdust, metals and powdered metals.

Avoid contamination of water, foodstuffs, feed or seed.

Segregate from alkalis, oxidizing agents and chemicals readily decomposed by acids, i.e. cyanides, sulfides, carbonates.

Section 11 - Toxicological Information

Toxicity

Oral (human) LD₅₀: 430 mg/kg

Inhalation (rat) LC₅₀: 2500 ppm/1 hr

Unreported (man) LD₅₀: 110 mg/kg

Irritation

Nil reported

See RTECS QU 5775000, for additional data.

Section 12 - Ecological Information

Environmental Fate: No data found.

Ecotoxicity: LC₅₀ Starfish 100-300 mg/l/48 hr /Aerated water conditions; LC₅₀ Shore crab 180 mg/l/48 hr /Static, aerated water conditions; LC₅₀ Cockle 330-1000 mg/l/48 hr /Aerated water conditions

BCF: no food chain concentration potential

Biochemical Oxygen Demand (BOD): none

Section 13 - Disposal Considerations

Disposal: Recycle wherever possible. Special hazards may exist - specialist advice may be required.
 Consult manufacturer for recycling options.
 Follow applicable federal, state, and local regulations.
 Treat and neutralize at an approved treatment plant.
 Decontaminate empty containers. Observe all label safeguards until containers are cleaned and destroyed.
 Puncture containers to prevent reuse and bury at an authorized landfill.

Section 14 - Transport Information

DOT Hazardous Materials Table Data (49 CFR 172.101):

Note: This material has multiple possible HMT entries. Choose the appropriate one based on state and condition of specific material when shipped.

Shipping Name and Description: Nitric acid *other than red fuming, with more than 70 percent nitric acid*

ID: UN2031

Hazard Class: 8 - Corrosive material

Packing Group: I - Great Danger

Symbols:

Label Codes: 8 - Corrosive, 5.1 - Oxidizer

Special Provisions: B47, B53, T10, TP2, TP12, TP13

Packaging: **Exceptions:** None **Non-bulk:** 158 **Bulk:** 243

Quantity Limitations: **Passenger aircraft/rail:** Forbidden **Cargo aircraft only:** 2.5 L

Vessel Stowage: **Location:** D **Other:** 44, 66, 89, 90, 110, 111



Shipping Name and Description: Nitric acid *other than red fuming, with not more than 70 percent nitric acid*

ID: UN2031

Hazard Class: 8 - Corrosive material

Packing Group: II - Medium Danger

Symbols:

Label Codes: 8 - Corrosive

Special Provisions: B2, B47, B53, IB2, T8, TP2, TP12

Packaging: **Exceptions:** None **Non-bulk:** 158 **Bulk:** 242

Quantity Limitations: **Passenger aircraft/rail:** Forbidden **Cargo aircraft only:** 30 L

Vessel Stowage: **Location:** D **Other:**



Shipping Name and Description: Nitric acid, red fuming

ID: UN2032

Hazard Class: 8 - Corrosive material

Packing Group: I - Great Danger

Symbols: + - Override definitions

Label Codes: 8 - Corrosive, 5.1 - Oxidizer, 6.1 - Poison *or* Poison Inhalation Hazard *if inhalation hazard, Zone A or B*

Special Provisions: 2, B9, B32, B74, T20, TP2, TP12, TP13, TP38, TP45

Packaging: **Exceptions:** None **Non-bulk:** 227 **Bulk:** 244

Quantity Limitations: **Passenger aircraft/rail:** Forbidden **Cargo aircraft only:** Forbidden

Vessel Stowage: **Location:** D **Other:**



Section 15 - Regulatory Information

EPA Regulations:

RCRA 40 CFR: Not listed

CERCLA 40 CFR 302.4: Listed per CWA Section 311(b)(4) 1000 lb (453.5 kg)

SARA 40 CFR 372.65: Listed

SARA EHS 40 CFR 355: Listed

RQ: 1000 lb

TPQ: 1000 lb

TSCA: Listed

Section 16 - Other Information

Disclaimer: Judgments as to the suitability of information herein for the purchaser's purposes are necessarily the purchaser's responsibility. Although reasonable care has been taken in the preparation of such information, Genium Group, Inc. extends no warranties, makes no representations, and assumes no responsibility as to the accuracy or suitability of such information for application to the purchaser's intended purpose or for consequences of its use.



Material Safety Data Sheet

The Dow Chemical Company

Product Name: DOWANOL™ PPH Glycol Ether

Issue Date: 02/11/2013

Print Date: 12 Feb 2013

The Dow Chemical Company encourages and expects you to read and understand the entire (M)SDS, as there is important information throughout the document. We expect you to follow the precautions identified in this document unless your use conditions would necessitate other appropriate methods or actions.

1. Product and Company Identification

Product Name

DOWANOL™ PPH Glycol Ether

COMPANY IDENTIFICATION

The Dow Chemical Company
2030 Willard H. Dow Center
Midland, MI 48674
United States

Customer Information Number:

800-258-2436

EMERGENCY TELEPHONE NUMBER

24-Hour Emergency Contact:

989-636-4400

Local Emergency Contact:

989-636-4400

2. Hazards Identification

Emergency Overview

Color: colourless

Physical State: Liquid.

Odor: Very slight

Hazards of product:

WARNING! Causes eye irritation. Isolate area.

OSHA Hazard Communication Standard

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Potential Health Effects

Eye Contact: May cause severe eye irritation. May cause slight corneal injury.

Skin Contact: Prolonged contact may cause slight skin irritation with local redness.

Skin Absorption: Prolonged skin contact is unlikely to result in absorption of harmful amounts.

Inhalation: At room temperature, vapors are minimal due to low volatility. Vapor from heated material or mist may be hazardous on single exposure. For respiratory irritation and narcotic effects: No relevant data found.

®(TM)*Trademark

Ingestion: Low toxicity if swallowed. Small amounts swallowed incidentally as a result of normal handling operations are not likely to cause injury; however, swallowing larger amounts may cause injury.

Aspiration hazard: Based on physical properties, not likely to be an aspiration hazard.

Birth Defects/Developmental Effects: Has caused birth defects in laboratory animals only at doses toxic to the mother.

3. Composition Information

Component	CAS #	Amount
Propylene glycol phenyl ether	770-35-4	> 99.5 %

4. First-aid measures

Description of first aid measures

General advice: First Aid responders should pay attention to self-protection and use the recommended protective clothing (chemical resistant gloves, splash protection). If potential for exposure exists refer to Section 8 for specific personal protective equipment.

Inhalation: Move person to fresh air; if effects occur, consult a physician.

Skin Contact: Wash skin with plenty of water.

Eye Contact: Immediately flush eyes with water; remove contact lenses, if present, after the first 5 minutes, then continue flushing eyes for at least 15 minutes. Obtain medical attention without delay, preferably from an ophthalmologist. Suitable emergency eye wash facility should be immediately available.

Ingestion: If swallowed, seek medical attention. Do not induce vomiting unless directed to do so by medical personnel.

Most important symptoms and effects, both acute and delayed

Aside from the information found under Description of first aid measures (above) and Indication of immediate medical attention and special treatment needed (below), no additional symptoms and effects are anticipated.

Indication of immediate medical attention and special treatment needed

No specific antidote. Treatment of exposure should be directed at the control of symptoms and the clinical condition of the patient.

5. Fire Fighting Measures

Suitable extinguishing media

Water fog or fine spray. Dry chemical fire extinguishers. Carbon dioxide fire extinguishers. Foam. Alcohol resistant foams (ATC type) are preferred. General purpose synthetic foams (including AFFF) or protein foams may function, but will be less effective. Water fog, applied gently may be used as a blanket for fire extinguishment.

Extinguishing Media to Avoid: Do not use direct water stream. May spread fire.

Special hazards arising from the substance or mixture

Hazardous Combustion Products: During a fire, smoke may contain the original material in addition to combustion products of varying composition which may be toxic and/or irritating. Combustion products may include and are not limited to: Carbon monoxide. Carbon dioxide.

Unusual Fire and Explosion Hazards: Violent steam generation or eruption may occur upon application of direct water stream to hot liquids.

Advice for firefighters

Fire Fighting Procedures: Keep people away. Isolate fire and deny unnecessary entry. Do not use direct water stream. May spread fire. Burning liquids may be moved by flushing with water to protect personnel and minimize property damage. Water fog, applied gently may be used as a blanket for fire extinguishment.

Special Protective Equipment for Firefighters: Wear positive-pressure self-contained breathing apparatus (SCBA) and protective fire fighting clothing (includes fire fighting helmet, coat, trousers, boots, and gloves). If protective equipment is not available or not used, fight fire from a protected location or safe distance.

6. Accidental Release Measures

Personal precautions, protective equipment and emergency procedures: Isolate area. Keep unnecessary and unprotected personnel from entering the area. Use appropriate safety equipment. For additional information, refer to Section 8, Exposure Controls and Personal Protection. Refer to Section 7, Handling, for additional precautionary measures.

Environmental precautions: Prevent from entering into soil, ditches, sewers, waterways and/or groundwater. See Section 12, Ecological Information.

Methods and materials for containment and cleaning up: Small spills: Absorb with materials such as: Sand. Vermiculite. Collect in suitable and properly labeled containers. Large spills: Contain spilled material if possible. Pump into suitable and properly labeled containers. See Section 13, Disposal Considerations, for additional information.

7. Handling and Storage

Handling

General Handling: Do not get in eyes. Avoid contact with skin and clothing. Wash thoroughly after handling. Keep container closed. Use with adequate ventilation. See Section 8, EXPOSURE CONTROLS AND PERSONAL PROTECTION.

Other Precautions: Spills of these organic materials on hot fibrous insulations may lead to lowering of the autoignition temperatures possibly resulting in spontaneous combustion.

Storage

Store in the following material(s): Carbon steel. Stainless steel. Phenolic lined steel drums. Do not store in: Aluminum. Copper. Galvanized iron. Galvanized steel.

Shelf life: Use within, Metal drums. 24 Months

Bulk 6 Months

8. Exposure Controls / Personal Protection

Exposure Limits

|| None established

Personal Protection

|| **Eye/Face Protection:** Use chemical goggles.

|| **Skin Protection:** Wear clean, body-covering clothing.

|| **Hand protection:** Use gloves chemically resistant to this material when prolonged or frequently repeated contact could occur. Examples of preferred glove barrier materials

include: Butyl rubber. Ethyl vinyl alcohol laminate ("EVAL"). Examples of acceptable glove barrier materials include: Natural rubber ("latex"). Neoprene. Nitrile/butadiene rubber ("nitrile" or "NBR"). Polyvinyl chloride ("PVC" or "vinyl"). NOTICE: The selection of a specific glove for a particular application and duration of use in a workplace should also take into account all relevant workplace factors such as, but not limited to: Other chemicals which may be handled, physical requirements (cut/puncture protection, dexterity, thermal protection), potential body reactions to glove materials, as well as the instructions/specifications provided by the glove supplier.

Respiratory Protection: Respiratory protection should be worn when there is a potential to exceed the exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, wear respiratory protection when adverse effects, such as respiratory irritation or discomfort have been experienced, or where indicated by your risk assessment process. Use an approved air-purifying respirator when vapors are generated at increased temperatures or when dust or mist is present. The following should be effective types of air-purifying respirators: Organic vapor cartridge with a particulate pre-filter.

Ingestion: Use good personal hygiene. Do not consume or store food in the work area. Wash hands before smoking or eating.

Engineering Controls

Ventilation: Use local exhaust ventilation, or other engineering controls to maintain airborne levels below exposure limit requirements or guidelines. If there are no applicable exposure limit requirements or guidelines, general ventilation should be sufficient for most operations. Local exhaust ventilation may be necessary for some operations.

9. Physical and Chemical Properties

Appearance

Physical State	Liquid.
Color	colourless
Odor	Very slight
Odor Threshold	No test data available
pH	No test data available
Melting Point	11 °C (52 °F) <i>Literature</i>
Freezing Point	11 °C (52 °F) <i>Literature</i>
Boiling Point (760 mmHg)	241.2 °C (466.2 °F) <i>Literature</i> .
Flash Point - Closed Cup	115 °C (239 °F) <i>Literature</i>
Evaporation Rate (Butyl Acetate = 1)	No test data available
Flammability (solid, gas)	No
Flammable Limits In Air	Lower: 0.8 %(V) <i>Literature</i> Upper: Not determined
Vapor Pressure	0.01 hPa @ 20 °C <i>Literature</i>
Vapor Density (air = 1)	5.27 <i>Literature</i>
Specific Gravity (H2O = 1)	1.060 20 °C/20 °C <i>ASTM D4052</i>
Solubility in water (by weight)	15.1 g/l @ 20 °C <i>Literature</i>
Partition coefficient, n-octanol/water (log Pow)	1.41 <i>Measured</i>
Autoignition Temperature	1,013 hPa 480 °C (896 °F) <i>Literature</i>
Decomposition Temperature	No test data available
Dynamic Viscosity	22.7 mPa.s @ 25 °C <i>Literature</i>
Kinematic Viscosity	21.4 mm ² /s <i>Literature</i>
Explosive properties	Not explosive
Oxidizing properties	No
Liquid Density	8.83 lb/gal @ 25 °C <i>Literature</i>
Molecular Weight	No test data available
Surface tension	67.8 mN/m @ 20 °C <i>Literature</i>

Henry's Law Constant (H) 4.41E-07 atm*m³/mole; 25 °C Estimated.

10. Stability and Reactivity

Reactivity

No dangerous reaction known under conditions of normal use.

Chemical stability

|| Thermally stable at typical use temperatures.

Possibility of hazardous reactions

|| Polymerization will not occur.

|| **Conditions to Avoid:** Do not distill to dryness. Product can oxidize at elevated temperatures.

|| **Incompatible Materials:** Avoid contact with: Strong acids. Strong bases. Strong oxidizers.

Hazardous decomposition products

|| Decomposition products depend upon temperature, air supply and the presence of other materials.
|| Decomposition products can include and are not limited to: Aldehydes. Ketones. Organic acids.

11. Toxicological Information

Acute Toxicity

Ingestion

|| LD50, rat > 2,000 mg/kg

Dermal

|| LD50, rat > 2,000 mg/kg

Inhalation

|| No deaths occurred following exposure to a saturated atmosphere. , 4 h, Aerosol, rat 5.4 mg/l

Eye damage/eye irritation

|| May cause severe eye irritation. May cause slight corneal injury.

Skin corrosion/irritation

|| Prolonged contact may cause slight skin irritation with local redness.

Sensitization

Skin

|| Did not cause allergic skin reactions when tested in guinea pigs.

Respiratory

|| No relevant data found.

Repeated Dose Toxicity

|| Based on available data, repeated exposures are not anticipated to cause additional significant adverse effects.

Chronic Toxicity and Carcinogenicity

|| No relevant data found.

Developmental Toxicity

|| Has caused birth defects in laboratory animals only at doses toxic to the mother.

Reproductive Toxicity

|| In animal studies, did not interfere with reproduction.

Genetic Toxicology

|| In vitro genetic toxicity studies were negative. Animal genetic toxicity studies were predominantly negative.

12. Ecological Information

Toxicity

Material is practically non-toxic to aquatic organisms on an acute basis (LC50/EC50/EL50/LL50 >100 mg/L in the most sensitive species tested).

Fish Acute & Prolonged Toxicity

LC50, Pimephales promelas (fathead minnow), static test, 96 h: 280 mg/l

Aquatic Invertebrate Acute Toxicity

LC50, Daphnia magna (Water flea), static test, 48 h, survival: 370 mg/l

Aquatic Plant Toxicity

EC50, Desmodesmus subspicatus (green algae), static test, Growth rate inhibition, 72 h: > 100 mg/l

Persistence and Degradability

Material is readily biodegradable. Passes OECD test(s) for ready biodegradability. Biodegradation rate may increase in soil and/or water with acclimation.

OECD Biodegradation Tests:

Biodegradation	Exposure Time	Method	10 Day Window
72 %	28 d	OECD 301F Test	fail

Indirect Photodegradation with OH Radicals

Rate Constant	Atmospheric Half-life	Method
3.72E-11 cm ³ /s	3.5 h	Estimated.

Theoretical Oxygen Demand: 2.31 mg/mg

Bioaccumulative potential

Bioaccumulation: Bioconcentration potential is low (BCF < 100 or Log Pow < 3).

Partition coefficient, n-octanol/water (log Pow): 1.41 Measured

Mobility in soil

Mobility in soil: Potential for mobility in soil is very high (Koc between 0 and 50).

Partition coefficient, soil organic carbon/water (Koc): 19 - 21 Estimated.

Henry's Law Constant (H): 4.41E-07 atm*m³/mole; 25 °C Estimated.

13. Disposal Considerations

DO NOT DUMP INTO ANY SEWERS, ON THE GROUND, OR INTO ANY BODY OF WATER. All disposal practices must be in compliance with all Federal, State/Provincial and local laws and regulations. Regulations may vary in different locations. Waste characterizations and compliance with applicable laws are the responsibility solely of the waste generator. AS YOUR SUPPLIER, WE HAVE NO CONTROL OVER THE MANAGEMENT PRACTICES OR MANUFACTURING PROCESSES OF PARTIES HANDLING OR USING THIS MATERIAL. THE INFORMATION PRESENTED HERE PERTAINS ONLY TO THE PRODUCT AS SHIPPED IN ITS INTENDED CONDITION AS DESCRIBED IN MSDS SECTION: Composition Information. FOR UNUSED & UNCONTAMINATED PRODUCT, the preferred options include sending to a licensed, permitted: Incinerator or other thermal destruction device.

14. Transport Information

DOT Non-Bulk

NOT REGULATED

DOT Bulk

NOT REGULATED

IMDG

NOT REGULATED

ICAO/IATA

NOT REGULATED

This information is not intended to convey all specific regulatory or operational requirements/information relating to this product. Additional transportation system information can be obtained through an authorized sales or customer service representative. It is the responsibility of the transporting organization to follow all applicable laws, regulations and rules relating to the transportation of the material.

15. Regulatory Information**OSHA Hazard Communication Standard**

This product is a "Hazardous Chemical" as defined by the OSHA Hazard Communication Standard, 29 CFR 1910.1200.

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Sections 311 and 312

Immediate (Acute) Health Hazard	Yes
Delayed (Chronic) Health Hazard	No
Fire Hazard	No
Reactive Hazard	No
Sudden Release of Pressure Hazard	No

Superfund Amendments and Reauthorization Act of 1986 Title III (Emergency Planning and Community Right-to-Know Act of 1986) Section 313

To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.

Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Hazardous Substances List and/or Pennsylvania Environmental Hazardous Substance List:

To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.

Pennsylvania (Worker and Community Right-To-Know Act): Pennsylvania Special Hazardous Substances List:

To the best of our knowledge, this product does not contain chemicals at levels which require reporting under this statute.

California Proposition 65 (Safe Drinking Water and Toxic Enforcement Act of 1986)

This product contains no listed substances known to the State of California to cause cancer, birth defects or other reproductive harm, at levels which would require a warning under the statute.

US. Toxic Substances Control Act

All components of this product are on the TSCA Inventory or are exempt from TSCA Inventory requirements under 40 CFR 720.30

CEPA - Domestic Substances List (DSL)

All substances contained in this product are listed on the Canadian Domestic Substances List (DSL) or are not required to be listed.

16. Other Information

Product Literature

Additional information on this product may be obtained by calling your sales or customer service contact. Ask for a product brochure.

Hazard Rating System

NFPA	Health	Fire	Reactivity
	1	1	0

Recommended Uses and Restrictions

Identified uses

Solvent for consumer and industrial applications.

Revision

Identification Number: 82587 / 0000 / Issue Date 02/11/2013 / Version: 3.0

Most recent revision(s) are noted by the bold, double bars in left-hand margin throughout this document.

Legend

N/A	Not available
W/W	Weight/Weight
OEL	Occupational Exposure Limit
STEL	Short Term Exposure Limit
TWA	Time Weighted Average
ACGIH	American Conference of Governmental Industrial Hygienists, Inc.
DOW IHG	Dow Industrial Hygiene Guideline
WEEL	Workplace Environmental Exposure Level
HAZ_DES	Hazard Designation
Action Level	A value set by OSHA that is lower than the PEL which will trigger the need for activities such as exposure monitoring and medical surveillance if exceeded.

The Dow Chemical Company urges each customer or recipient of this (M)SDS to study it carefully and consult appropriate expertise, as necessary or appropriate, to become aware of and understand the data contained in this (M)SDS and any hazards associated with the product. The information herein is provided in good faith and believed to be accurate as of the effective date shown above. However, no warranty, express or implied, is given. Regulatory requirements are subject to change and may differ between various locations. It is the buyer's/user's responsibility to ensure that his activities comply with all federal, state, provincial or local laws. The information presented here pertains only to the product as shipped. Since conditions for use of the product are not under the control of the manufacturer, it is the buyer's/user's duty to determine the conditions necessary for the safe use of this product. Due to the proliferation of sources for information such as manufacturer-specific (M)SDSs, we are not and cannot be responsible for (M)SDSs obtained from any source other than ourselves. If you have obtained an (M)SDS from another source or if you are not sure that the (M)SDS you have is current, please contact us for the most current version.

Section 1 - Chemical Product and Company Identification

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Material Name: Sulfuric Acid

CAS Number: 7664-93-9

Chemical Formula: H₂O₄S

Structural Chemical Formula: H₂SO₄

EINECS Number: 231-639-5

ACX Number: X1002217-4

Synonyms: ACIDE SULFURIQUE; ACIDO SOLFORICO; ACIDO SULFURICO; BATTERY ACID; BOV; DIHYDROGEN SULFATE; DIPPING ACID; ELECTROLYTE ACID; EPA PESTICIDE CHEMICAL CODE 078001; HYDROGEN SULFATE; MATTLING ACID; OIL OF VITRIOL; SCHWEFELSAEURELOESUNGEN; SULFURIC ACID; SULFURIC ACID (AQUEOUS); SULFURIC ACID, SPENT; SULPHURIC ACID; VITRIOL BROWN OIL; ZWAVELZUROPLOSSINGEN

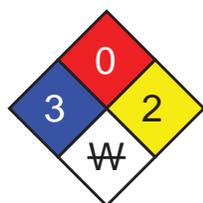
General Use: The manufacture of superphosphate fertilizer, inorganic and petro-chemicals, explosives and pigments. Component of heavy duty metal cleaners, pickles. In manufacture of rayon, cellulose film. As battery electrolyte and also in electroplating processes.

Section 2 - Composition / Information on Ingredients

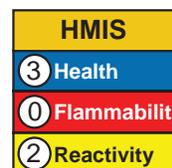
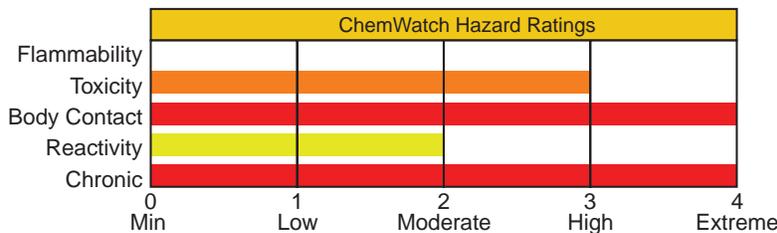
Name	CAS	%
sulfuric acid	7664-93-9	>51
water	7732-18-5	remainder

OSHA PEL TWA: 1 mg/m ³ .	NIOSH REL TWA: 1 mg/m ³ .	DFG (Germany) MAK TWA: 0.1 mg/m ³ ; PEAK: 0.1 mg/m ³ ; Ceiling: 0.2 mg/m ³ ; measured as inhalable fraction of the aerosol.
ACGIH TLV TWA: 1 mg/m ³ ; STEL: 3 mg/m ³ ; A2 = as contained in strong inorganic acid mists.	IDLH Level 15 mg/m ³ .	

Section 3 - Hazards Identification



Fire Diamond



Corrosive

ANSI Signal Word

Danger!

☆☆☆☆☆ **Emergency Overview** ☆☆☆☆☆

Colorless to dark-brown, oily, odorless liquid. Corrosive. Other Acute Effects: blindness. Chronic Effects: tooth erosion, GI disturbances, dermatitis. Reaction with water produces excessive heat.

Potential Health Effects

Target Organs: respiratory system, eyes, skin, teeth

Primary Entry Routes: inhalation, skin contact, eye contact

Acute Effects

Inhalation: The vapor is extremely discomforting to the upper respiratory tract and is capable of causing severe mucous membrane irritation, upper respiratory tract inflammation. Exposure to high concentrations causes bronchitis and is characterized by the onset of hemorrhagic pulmonary edema.

Mists are highly irritating to eyes, mucous membranes and respiratory tract and high mist concentrations may lead to pulmonary edema.

Eye: HIGHLY CORROSIVE The liquid is extremely corrosive to the eyes and any contact may cause rapid tissue destruction and is capable of causing severe damage with loss of sight.

The mist is highly corrosive and contact may cause rapid tissue destruction.

The vapor is extremely discomforting to the eyes.

The material may produce severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

Skin: HIGHLY CORROSIVE. The liquid is extremely corrosive to the skin and any contact may cause rapid tissue destruction with severe burns.

The mist is highly discomforting to the skin and may cause deep ulceration to body tissue.

Topical application of a 10% solution to skin on the scapula or waist produces only negligible evidence of irritation.

Ingestion: HIGHLY CORROSIVE and Considered toxic by all exposure routes.

The liquid is extremely corrosive and may rapidly cause severe burns to the gastrointestinal tract and may be fatal if swallowed in quantity.

Considered an unlikely route of entry in commercial/industrial environments.

Carcinogenicity: NTP - Not listed; IARC - Group 1, Carcinogenic to humans; OSHA - Not listed; NIOSH - Not listed; ACGIH - Class A2, Suspected human carcinogen; EPA - Not listed; MAK - Not listed.

Chronic Effects: Repeated minor exposure to mists can cause erosion of teeth and inflammation of the upper respiratory tract leading to chronic bronchitis.

Repeated skin contact with dilute solutions may cause dermatitis.

Lungs of sulfuric acid plant workers appear to be less affected than the lungs of workers exposed to "dust".

There is evidence that the corrosion of tooth enamel occurs at 1 mg/m³ but that acclimatized workers could tolerate three to four times that level. Forming room workers in a battery factory exposed to 3 to 16 mg/m³ sulfuric acid mist concentrations exhibited the most serious signs of erosion whilst charging room workers exposed to 0.08 to 2.5 mg/m³ were affected to a lesser degree.

Workers chronically exposed to sulfuric acid mists may show various skin lesions, tracheobronchitis, stomatitis, conjunctivitis and gastritis.

Increased risk of laryngeal cancer is associated with chronic exposures.

Section 4 - First Aid Measures

Inhalation: Remove to fresh air.

Lay patient down. Keep warm and rested.

If available, administer medical oxygen by trained personnel.

If breathing is shallow or has stopped, ensure clear airway and apply resuscitation. Transport to hospital or doctor, without delay.

See
DOT
ERG

Eye Contact: Immediately hold the eyes open and flush continuously for at least 15 minutes with fresh running water. Ensure irrigation under eyelids by occasionally lifting the upper and lower lids.

Transport to hospital or doctor without delay. Removal of contact lenses after an eye injury should only be undertaken by skilled personnel.

Skin Contact: Immediately flush body and clothes with large amounts of water, using safety shower if available.

Quickly remove all contaminated clothing, including footwear.

Wash affected areas with water (and soap if available) for at least 15 minutes. Transport to hospital or doctor.

DO NOT attempt to neutralize burns with alkaline solutions.

Ingestion: Rinse mouth out with plenty of water.

Contact a Poison Control Center.

Do NOT induce vomiting. Give a glass of water.

After first aid, get appropriate in-plant, paramedic, or community medical support.

Note to Physicians: For acute or short-term repeated exposures to strong acids:

1. Airway problems may arise from laryngeal edema and inhalation exposure.

Treat with 100% oxygen initially.

2. Respiratory distress may require cricothyroidotomy if endotracheal intubation is contraindicated by excessive swelling.

3. Intravenous lines should be established immediately in all cases where there is evidence of circulatory compromise.

4. Strong acids produce a coagulation necrosis characterized by formation of a coagulum (eschar) as a result of the desiccating action of the acid on proteins in specific tissues.

INGESTION:

1. Immediate dilution (milk or water) within 30 minutes post-ingestion is recommended.

2. Do not attempt to neutralize the acid since exothermic reaction may extend the corrosive injury.

3. Be careful to avoid further vomiting since re-exposure of the mucosa to the acid is harmful. Limit fluids to one or two glasses in an adult.

4. Charcoal has no place in acid management.

5. Some authors suggest the use of lavage within 1 hour of ingestion.

SKIN:

- 1.Skin lesions require copious saline irrigation. Treat chemical burns as thermal burns with non-adherent gauze and wrapping.
- 2.Deep second-degree burns may benefit from topical silver sulfadiazine.

EYE:

- 1.Eye injuries require retraction of the eyelids to ensure thorough irrigation of the conjunctival cul-de-sacs. Irrigation should last at least 20-30 minutes. Do not use neutralizing agents or any other additives. Several liters of saline are required.
- 2.Cycloplegic drops (1% cyclopentolate for short-term use or 5% homatropine for longer term use), antibiotic drops, vasoconstrictive agents, or artificial tears may be indicated dependent on the severity of the injury.
- 3.Steroid eye drops should only be administered with the approval of a consulting ophthalmologist.

Section 5 - Fire-Fighting Measures

Flash Point: Nonflammable

Autoignition Temperature: Not applicable

LEL: Not applicable

UEL: Not applicable

Extinguishing Media: Use extinguishing media suitable for surrounding area. Water spray or fog, from a safe distance only.

General Fire Hazards/Hazardous Combustion Products: HIGHLY CORROSIVE.

Noncombustible liquid. Reacts vigorously with water.

Heating may cause expansion or decomposition leading to violent rupture of containers.

Contact with readily oxidizable organic material may cause ignition /fire.

Reacts with metals producing flammable/explosive hydrogen gas.

Decomposes on heating and produces acrid and toxic fumes of sulfur oxides (SO_x).

Fire Incompatibility: Reacts with mild steel, galvanized steel/zinc producing hydrogen gas which may form an explosive mixture with air.

Contact with readily oxidizable organic material may cause ignition /fire.

Avoid any contamination of this material as it is very reactive and any contamination is potentially hazardous.

Fire-Fighting Instructions: Contact fire department and tell them location and nature of hazard.

May be violently or explosively reactive. Wear full body protective clothing with breathing apparatus. Prevent, by any means available, spillage from entering drains or waterways. Consider evacuation.

Use water delivered as a fine spray to control fire and cool adjacent area.

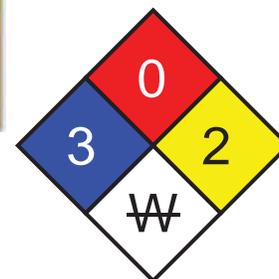
Avoid spraying water onto liquid pools.

Do not approach containers suspected to be hot.

Cool fire-exposed containers with water spray from a protected location.

If safe to do so, remove containers from path of fire.

Equipment should be thoroughly decontaminated after use.



Fire Diamond

Section 6 - Accidental Release Measures

Small Spills: Clean up all spills immediately.

Avoid breathing vapors and contact with skin and eyes.

Control personal contact by using protective equipment.

Contain and absorb spill with sand, earth, inert material or vermiculite.

Wipe up. Place in a suitable labeled container for waste disposal.

Use soda ash or slaked lime to neutralize.

Large Spills: DO NOT touch the spill material. Clear area of personnel and move upwind.

Contact fire department and tell them location and nature of hazard.

May be violently or explosively reactive. Wear full body protective clothing with breathing apparatus. Prevent, by any means available, spillage from entering drains or waterways. Consider evacuation.

Stop leak if safe to do so.

Contain spill with sand, earth or vermiculite.

Collect recoverable product into labeled containers for recycling.

Neutralize/decontaminate residue.

Collect solid residues and seal in labeled drums for disposal.

Wash area and prevent runoff into drains.

After clean-up operations, decontaminate and launder all protective clothing and equipment before storing and reusing.

If contamination of drains or waterways occurs, advise emergency services.

DO NOT USE WATER OR NEUTRALIZING AGENTS INDISCRIMINATELY ON LARGE SPILLS.

Regulatory Requirements: Follow applicable OSHA regulations (29 CFR 1910.120).



Section 7 - Handling and Storage

Handling Precautions: Avoid generating and breathing mist. Avoid all personal contact, including inhalation.

Wear protective clothing when risk of exposure occurs.

Use in a well-ventilated area.

WARNING: To avoid violent reaction, ALWAYS add material to water and NEVER water to material.

Avoid smoking, bare lights or ignition sources.

Avoid contact with incompatible materials.

When handling, DO NOT eat, drink or smoke.

Keep containers securely sealed when not in use. Avoid physical damage to containers. Always wash hands with soap and water after handling. Work clothes should be laundered separately.

Launder contaminated clothing before reuse.

Use good occupational work practices. Observe manufacturer's storing and handling recommendations. Atmosphere should be regularly checked against established exposure standards to ensure safe working conditions are maintained.

Recommended Storage Methods: Glass carboy. Glass container is suitable for laboratory quantities.

Plastic carboy. Polylined drum.

Check that containers are clearly labeled.

Packaging as recommended by manufacturer.

DO NOT use mild steel or galvanized containers.

Regulatory Requirements: Follow applicable OSHA regulations.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: Use in a well-ventilated area.

General exhaust is adequate under normal operating conditions.

Local exhaust ventilation may be required in special circumstances.

If risk of overexposure exists, wear NIOSH-approved respirator. Correct fit is essential to ensure adequate protection.

Provide adequate ventilation in warehouses and enclosed storage areas.

Personal Protective Clothing/Equipment:

Eyes: Chemical goggles. Full face shield.

Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them.

Hands/Feet: Wear chemical protective gloves, eg. PVC.

Wear safety footwear or safety gumboots, eg. Rubber.

Respiratory Protection:

Exposure Range >1 to 10 mg/m³: Air Purifying, Negative Pressure, Half Mask

Exposure Range >10 to <15 mg/m³: Air Purifying, Negative Pressure, Full Face

Exposure Range 15 to unlimited mg/m³: Self-contained Breathing Apparatus, Pressure Demand, Full Face

Cartridge Color: white with dust/mist prefilter (use P100 or consult supervisor for appropriate dust/mist prefilter)

Other: Overalls. PVC apron. PVC protective suit may be required if exposure severe.

Eyewash unit. Ensure there is ready access to a safety shower.

Glove Selection Index:

NATURAL RUBBER..... Best selection

NATURAL+NEOPRENE..... Best selection

NEOPRENE..... Best selection

NEOPRENE/NATURAL..... Best selection

NITRILE..... Best selection

PE..... Best selection

PVC..... Best selection

SARANEX-23 Best selection

Section 9 - Physical and Chemical Properties

Appearance/General Info: Colorless, oily, dense, HIGHLY CORROSIVE liquid. Faint acid odor.

Material is a powerful oxidizing and dehydrating agent causing rapid human tissue destruction on contact.

Concentrated acid is very exothermic (generates heat) when mixed with water.

DANGER: Adding water to acid will cause violent steam explosion, scattering corrosive acid. Always add acid slowly to water.

Mixes with alcohol in all proportions. Available in technical, pure and analytical grades

Physical State: Liquid

Evaporation Rate: Non Vol. at 38 °C

Odor Threshold: 1.0 mg/m³

pH: < 1

Vapor Pressure (kPa): 0.133 at 146 °C

pH (1% Solution): 1

Vapor Density (Air=1): 3.40

Boiling Point: About 290 °C (554 °F)

Formula Weight: 98.07

Freezing/Melting Point: 10.36 °C (50.648 °F)

Specific Gravity (H₂O=1, at 4 °C): 1.6-1.84 at 15 °C

Decomposition Temperature (°C): 340

Water Solubility: Soluble in water

Section 10 - Stability and Reactivity

Stability/Polymerization/Conditions to Avoid: Product is considered stable. Hazardous polymerization will not occur.

Storage Incompatibilities: Segregate from alkalis, oxidizing agents and chemicals readily decomposed by acids, i.e. cyanides, sulfides, carbonates.

Reacts vigorously with water and alkali.

Contact with readily oxidizable organic material may cause ignition /fire.

Avoid contamination of water, foodstuffs, feed or seed.

Section 11 - Toxicological Information

Toxicity

Oral (rat) LD₅₀: 2140 mg/kg

Inhalation (rat) LC₅₀: 510 mg/m³/2h

Inhalation (human) TC_{Lo}: 3 mg/m³/24w

Irritation

Eye (rabbit): 1.38 mg SEVERE

Eye (rabbit): 5 mg/30sec SEVERE

See RTECS WS 5600000, for additional data.

Section 12 - Ecological Information

Environmental Fate: No data found.

Ecotoxicity: TL_m Lepomis macrochirus (bluegill) 24.5 ppm/24 hr fresh water /Conditions of bioassay not specified; LC₅₀ Flounder 100 to 330 mg/l/48 hr aerated water /Conditions of bioassay not specified; LC₅₀ Shrimp 80 to 90 mg/l/48 hr aerated water /Conditions of bioassay not specified; LC₅₀ Prawn 42.5 ppm/48 hr salt water /Conditions of bioassay not specified

BCF: no food chain concentration potential

Biochemical Oxygen Demand (BOD): none

Section 13 - Disposal Considerations

Disposal: Recycle wherever possible or consult manufacturer for recycling options.

Follow applicable federal, state, and local regulations.

Treat and neutralize at an effluent treatment plant.

Use soda ash or slaked lime to neutralize.

Recycle containers, otherwise dispose of in an authorized landfill.

Bury residue in an authorized landfill.

Section 14 - Transport Information

DOT Hazardous Materials Table Data (49 CFR 172.101):

Shipping Name and Description: Sulfuric acid with more than 51 percent acid

ID: UN1830

Hazard Class: 8 - Corrosive material

Packing Group: II - Medium Danger

Symbols:

Label Codes: 8 - Corrosive

Special Provisions: A3, A7, B3, B83, B84, IB2, N34, T8, TP2, TP12

Packaging: Exceptions: 154 **Non-bulk:** 202 **Bulk:** 242

Quantity Limitations: Passenger aircraft/rail: 1 L **Cargo aircraft only:** 30 L

Vessel Stowage: Location: C **Other:** 14



Section 15 - Regulatory Information

EPA Regulations:

RCRA 40 CFR: Not listed

CERCLA 40 CFR 302.4: Listed per CWA Section 311(b)(4) 1000 lb (453.5 kg)

SARA 40 CFR 372.65: Listed

SARA EHS 40 CFR 355: Listed

RQ: 1000 lb

TPQ: 1000 lb

TSCA: Listed

Section 16 - Other Information

Disclaimer: Judgments as to the suitability of information herein for the purchaser's purposes are necessarily the purchaser's responsibility. Although reasonable care has been taken in the preparation of such information, Genium Group, Inc. extends no warranties, makes no representations, and assumes no responsibility as to the accuracy or suitability of such information for application to the purchaser's intended purpose or for consequences of its use.

Attachment 4

Forms

Utilities and Structures Checklist

Project: _____
 Project Number: _____
 Date: _____

Work locations applicable to this clearance checklist (**Photo Document Work Locations**):

THIS FORM MUST BE COMPLETED IN ENTIRETY PRIOR TO BEGINNING ANY INTRUSIVE WORK

Pre-Field Work

One Call or "811" notified 48-72 hours in advance of work? Yes No
 Utility companies notified during the One Call process See attached ticket

 List any other utilities requiring notification: None

Private Locator Contacted Yes No
 Plan private utility clearance subcontractor assignments, areas, required clearance equipment, depth of clearance needed, types of utilities
 Client provided utility maps or "as built" drawings showing utilities? Yes No

Field Work - This must be completed on site, by staff who have a minimum of one year of field experience in identifying utilities

Lines of Evidence - Must have **3 Reliable Lines of Evidence** Prior to Starting any Intrusive Work

One Call/"811"
 Utility Markings Present: Paint Pin flags/stakes Other None
 Client Provided Maps/Drawings **OR** Maps/Drawings requested but not provided
 Client Clearance Name(s)/Affiliation(s) _____
 Interview(s): Name(s)/Affiliation(s) _____

Did person(s) interviewed indicate depths of any utilities in the subsurface?
 Yes, depths provided:
 Did not know or refused to answer
 Additional Comments:

- Site Inspection & Complete Site Sketch (**Photo Document Marked Utilities & Utility Structures**)
- GPR
- Air-Knife
- Hydro-Knife
- Public Records/Maps
- Radiofrequency
- Metal Detector
- Handauger
- Potholing
- Probing
- Private Locator: Name and Company: _____
- Marine Locator: Name and Company: _____
- Other: _____

Tips for Successful Utility Location:

1. Don't forget to look up
2. Be on site when utilizing private utility locators
3. Select alternate/backup locations during clearance process
4. **Mark out all known utilities. Leave nothing to question**
5. No hammering- no pickaxes-no digging bars-no hurrying or shortcutting
6. No excessive turning or downward force of handaugers/shovels, etc.
7. Utilities may run directly under asphalt/concrete or be > 5 ft. in depth



Site Inspection

Utilities and Structures Checklist

During the site inspection look for the following ("**YES**" requires additional investigation and must be marked properly prior to performing intrusive work):

	Utility Color Codes		
a) Natural gas line present (evidence of a gas meter)?	Yellow	<input type="checkbox"/> Yes	<input type="checkbox"/> No
b) Evidence of electric lines:	Red		
i) Conduits to ground from electric meter or along wall?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
ii) Light poles, electric devices with no overhead lines?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
iii) Overhead electric lines present?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
c) Evidence of sewer drains:	Green		
i) Restrooms or kitchen on site?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
ii) Sewer cleanouts present?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
iii) Combined sewer /storm lines or multiple sewer lines?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
d) Evidence of water lines:	Blue		
i) Water meter on site or multiple water lines?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
ii) Fire hydrants in vicinity of work?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
iii) Irrigation systems? (Sprinkler heads, valve boxes, controls in building)		<input type="checkbox"/> Yes	<input type="checkbox"/> No
e) Evidence of storm drains:	Green		
i) Open curbside or slotted grate storm drains		<input type="checkbox"/> Yes	<input type="checkbox"/> No
ii) Gutter down spouts going into ground		<input type="checkbox"/> Yes	<input type="checkbox"/> No
f) Evidence of telecommunication lines:	Orange		
i) Fiber optic warning signs in areas?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
ii) Lines from cable boxes running into ground?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
iii) Conduits from power poles running into ground?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
iv) Aboveground boxes or housings or wires in work area?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
g) Underground storage tanks:			
i) Tank pit present?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
ii) Product lines running to dispensers/buildings?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
iii) Vent present away from tank pit?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
h) Do utilities enter or exit existing structures/buildings?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
If Yes, confirm the utility markings outside of structure/building match up.			
i) Proposed excavation marked in white?	White	<input type="checkbox"/> Yes	<input type="checkbox"/> No
j) Overhead Utilities/Communication Lines Look Up :			
i) Overhead electrical conduit, pipe chases, cable trays ?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
ii) Overhead fire sprinkler system?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
iii) Other overhead lines/utilities, product lines, AC condenser lines?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
k) Aboveground Power lines in or near the work area:			
i) < 50 kV within 10 ft. of work area?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
ii) >50 - 200 kV within 15 ft. of work area?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
iii) >200-350 kV within 20 ft. of work area?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
iv) >350-500 kV within 25 ft. of work area?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
v) >500-750 kV within 35 ft. of work area?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
vi) >750-1000 kV within 45 ft. of work area?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
l) Other:			
i) Evidence of linear asphalt or concrete repair?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
ii) Evidence of linear ground subsidence or change in vegetation?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
iii) Unmarked manholes or valve covers in work area?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
iv) Warning signs ("Call Before you Dig", etc.) on or adjacent to site?		<input type="checkbox"/> Yes	<input type="checkbox"/> No
v) Utility color markings not illustrated in this checklist?		<input type="checkbox"/> Yes	<input type="checkbox"/> No

Do not initiate intrusive work if utilities are suspected to be present in area and are not located, if markings are over 14 days old, or if clearance methods provide incomplete or conflicting information. Do not perform intrusive work within 30 inches of a utility marking without receiving pre-approval by Corporate H&S .

Name and Signature of person completing the checklist: _____
Date: _____



TAILGATE HEALTH & SAFETY MEETING FORM

This form documents the tailgate meeting conducted in accordance with the Project HASP. Personnel who perform work operations on-site during the day are required to attend this meeting and to acknowledge their attendance, at least daily.

Project Name:			Project Location:		
Date:	Time:	Conducted by:	Signature/Title:		
Client:		Client Contact:	Subcontractor companies:		

TRACKing the Tailgate Meeting

Think through the Tasks (list the tasks for the day):

1 _____	3 _____	5 _____
2 _____	4 _____	6 _____

Other Hazardous Activities - Check the box if there are any other ARCADIS, Client or other party activities that may pose hazards to ARCADIS operations If there are none, write "None" here: _____

If yes, describe them here: _____

How will they be controlled? _____

Pework Authorization - check activities to be conducted that require permit issuance or completion of a checklist or similar before work begins:

	<u>Doc #</u>		<u>Doc #</u>
<input type="checkbox"/> Not applicable	<u>Doc #</u>	<input type="checkbox"/> Working at Height	<u>Doc #</u>
<input type="checkbox"/> Energy Isolation (LOTO)	<u>Doc #</u>	<input type="checkbox"/> Excavation/Trenching	<u>Doc #</u>
<input type="checkbox"/> Mechanical Lifting Ops	<u>Doc #</u>	<input type="checkbox"/> Overhead & Buried Utilities	<u>Doc #</u>
		<input type="checkbox"/> Confined Space	<u>Doc #</u>
		<input type="checkbox"/> Hot Work	<u>Doc #</u>
		<input type="checkbox"/> Other permit	<u>Doc #</u>

Discuss following questions (for some review previous day's post activities). **Check if yes :**

<input type="checkbox"/> Incidents from day before to review?	<input type="checkbox"/> Lessons learned from the day before?	<input type="checkbox"/> Topics from Corp H&S to cover?
<input type="checkbox"/> Any corrective actions from yesterday?	<input type="checkbox"/> Will any work deviate from plan?	<input type="checkbox"/> Any Stop Work Interventions yesterday?
<input type="checkbox"/> JLAS or procedures are available?	<input type="checkbox"/> Field teams to "dirty" JLAS, as needed?	<input type="checkbox"/> If deviations, notify PM & client
<input type="checkbox"/> Staff has appropriate PPE?	<input type="checkbox"/> Staff knows Emergency Plan (EAP)?	<input type="checkbox"/> All equipment checked & OK?
		<input type="checkbox"/> Staff knows gathering points?

Comments: _____

Recognize the hazards (check all those that are discussed) (Examples are provided) and **Assess** the Risks (Low, Medium, High - circle risk level) - Provide an overall assessment of hazards to be encountered today and briefly list them under the hazard category.

<input type="checkbox"/> Gravity (i.e., ladder, scaffold, trips) (L M H)	<input type="checkbox"/> Motion (i.e., traffic, moving water) (L M H)	<input type="checkbox"/> Mechanical (i.e., augers, motors) (L M H)
<input type="checkbox"/> Electrical (i.e., utilities, lightning) (L M H)	<input type="checkbox"/> Pressure (i.e., gas cylinders, wells) (L M H)	<input type="checkbox"/> Environment (i.e., heat, cold, ice) (L M H)
<input type="checkbox"/> Chemical (i.e., fuel, acid, paint) (L M H)	<input type="checkbox"/> Biological (i.e., ticks, poison ivy) (L M H)	<input type="checkbox"/> Radiation (i.e., alpha, sun, laser) (L M H)
<input type="checkbox"/> Sound (i.e., machinery, generators) (L M H)	<input type="checkbox"/> Personal (i.e. alone, night, not fit) (L M H)	<input type="checkbox"/> Driving (i.e. car, ATV, boat, dozer) (L M H)

Continue TRACK Process on Page 2

Real Time Exposure Monitoring Data Collection Form

Document all air monitoring conducted on the Site below. Keep this form with the project file.

Site Name: _____ Date: _____

Instrument: _____ Model: _____ Serial #: _____

Calibration Method: (Material used settings, etc.)	
Calibration Results:	
Calibrated By:	

Activity Being Monitored	Compounds/Hazards Monitored	Time	Reading	Action Required? Y/N

Describe Any Actions Taken as a Result of this Air Monitoring and Why (does it match Table 5-1):

Hazardous Materials Shipment Form

Material Description and Proper Shipping Name (per DOT or IATA)	Shipment Quantity	DOT Hazard Classification	Shipment Method (air/ground)

List Shipper (i.e., who we are offering the shipment to):

List Trained Employee(s):

Attachment 5

Shipping Determination



**HAZARDOUS MATERIALS SHIPPING/TRANSPORTATION
DETERMINATION FORM**

Revision 6, 1/16/2014

Date:	7/14/2014
Project Name:	Freedom
Project Number:	OH003003.0001
Supplemental Information:	None

Description of the Material to be Transported or Shipped:

Water with ppb or low ppm concentrations of volatile constituents with no sheens or odors

- This material is mixed with water, soil or other inert material
- This material will be shipped on wet or blue ice
- This material will be shipped on dry ice

This material is: **Not Restricted/Not Regulated for transportation purposes**

Complete for Hazardous Materials:

UN/NA# "UNXXXX":	NA	PG:	NA	Hazard Class:	NA
		Subsidiary Hazard Class:	NA		NA

PSN: NA

--

Add the word "mixture" or "solution" in cell above if not already included in the PSN

Use ChemTel 24/7 Emergency Phone and Contract Number for this shipment: 1-800-255-3924 (ChemTel #MIS0007883) Register this shipment with ChemTel: Have carrier tracking number available. <http://arcadis.chemtel.net/>

This material is a: **No additional criteria applies to this material**

Complete for all Shipments: The Following Packaging will be Used:

Packaging Type:	Combination Package - Non-Bulk
Inner Packaging:	Glass receptacles
# of Single /Inners: ≤6	Net Qty Each Single/Inner: 500 ml
Intermediate Packaging:	Plastic bag/liner
Outer Packaging:	Non-specification box- plastic (sample cooler)
Other:	None

This material will be shipped (mode of transport):

Air as a non-restricted consignment

If using an exception/exemption, list the exception/exemption below:

None

Carrier/Transporter information:

FedEx Express (Air)

- ARCADIS Shipping Guide US-001 attached
- Other package closure information attached:

- 1) Air shipments requiring a Shipper's Declaration or ground shipments requiring shipping papers (with red hatchings) must be prepared using carrier approved software.
- 2) When required to present, the UN Number on the outside of the package must be 12 mm in height. Use **Arial regular 48 pt.** to type the UN Number. The Proper Shipping Name is not subject to this size requirement.
- 3) Early planning is key to safe transport of HazMat. If project will generate investigation derived waste materials that will require disposal in the future, consider RCRA and waste classification issues in advance. If required, contact Tim Ratchford or Kim Golden for RCRA and waste profiling assistance.

Special Instructions:

References and Rationale for the Determination:

The indicated concentrations of constituents in groundwater are not expected to meet the definition of a hazard class or division under USDOT or IATA. This determination is void if materials collected at the site indicate the presence of product or exhibit other characteristic that indicates the material meets the definition of a USDOT hazard class or division.

This determination does not consider the collection of soil samples using EPA 5035 methods.

Determination performed by: Tricia Trommer

Determination QA/QC performed by: X
(right click on signature, select "sign")