



Orange and Rockland Utilities, Inc.

**Environmental Health and Safety
Plan (E-HASP)**

Port Jervis Former MGP Site
Port Jervis, New York
Site No. 3-36-049

March 2010

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1. Introduction

All work on this project will be carried out in compliance with ARCADIS' Health and Safety (H&S) policies and procedures, and the Occupational Safety and Health Administration's (OSHA's) Hazardous Waste Operations and Emergency Response (HAZWOPER) regulation 29 CFR 1910.120. The design of this Health and Safety Plan (HASP) conforms to the requirements of the ARC HSFS010 (HASP H&S Procedure). Specific health and safety information for the project is contained in this HASP. All personnel working on hazardous operations or in the area of hazardous operations shall read and be familiar with this HASP before doing any work. All project personnel shall sign the appropriate signature form acknowledging that they have read and understand this HASP.

Changes in the scope of the project or introduction of new hazards to the project shall require revision of the HASP by the HASP writer and reviewer, and approval by the Project Manager. The HASP Addendum Page and Log Table are included as Appendix A.

2. Project Site History and Requirements

2.1 Site Description

Site Type: (Check as many as applicable)

X	Active	X	Secure (see Note 1)	X	Industrial		Landfill		Service station
	Inactive	X	Unsecured (see Note 1)	X	Commercial		Well field		Water work
			Uncontrolled	X	Residential		Railroad		Undeveloped

Note 1: The area occupied by the former manufactured gas plant is enclosed by chain-link fencing; however, off-site areas (where subsurface impacts have also been observed) are not secure.

The former MGP site is located at 16 Pike Street in a residential/commercial section of the City of Port Jervis, Orange County, New York. The site is generally bordered by Brown Street to the north, Water Street to the west, King Street to the east, and Pike Street to the south. The Delaware River is located approximately 160 feet to the southwest of the former MGP site (beyond Water Street) and is a Class A water body along this stretch.

The site is occupied by the approximately 1.2-acre Orange and Rockland Utilities, Inc.- (O&R-) owned Operations Center, which is zoned for commercial/industrial purposes and is enclosed by an 8-foot-high chain link fence topped with barbed wire. There are a number of buildings/structures located within the Operations Center. The largest of these buildings/structures is a single-story brick office building (referred to herein as the office building) containing a customer service center, several offices, an equipment store room, an open garage bay area, and two loading docks. The building is constructed on-grade and does not have a basement. A second smaller brick building (referred to herein as the communications building) is located to the southwest of the office building and contains telecommunications equipment. A microwave tower is located adjacent to the southwest side of the communications building. A fenced gas regulator station is located to the west of the office and communications buildings (adjacent to Water Street). The front of the office building is a grassed area that provides public access to the building. The remainder of the Operations Center is primarily covered with a gravel/asphalt surface and is used as a reporting location and storage area for gas and electric crews.

There are several properties/areas located adjacent to the site, including:

- Vacant Apartment Property – A vacant two-story apartment building occupies the O&R-owned property located immediately south of the Operations Center on the corner of Pike and Water Streets (on the same city block as the Operations Center). A partial basement is present beneath the northeast portion of the apartment building.
- 28 Pike Street – The 28 Pike Street property is privately-owned and located immediately east of the Operations Center on the corner of Pike and King Streets (on the same city block as the Operations Center). The property is primarily occupied by a three-story building. The basement and first floor of the building is a restaurant. The second and third floors of the building are apartment units.
- Pike, Water, Brown, and King Street Roadways – These two-lane streets surround the site and are paved. Pike Street, also known as NYS Route 209, is a high traffic volume route from/to the adjacent Delaware River Bridge.
- 1 – 9 Pike Street and 2 – 4 First Street (Meder properties southeast of the site) – These properties are located across Pike Street from the site and are owned by the same owner. The 1 – 9 Pike Street property is a mixed use property containing a retail building (owner-occupied as a book store with a rented church above); a tenant-occupied boarding and apartment house; a meeting hall rented with the church; and an owner-occupied storage shed. Immediately adjacent to this property is the Meder residence (located at 2 – 4 First Street).

2.2 Site History

In the mid-1800s, the Port Jervis Gas and Light Company operated the MGP at the site. The MGP utilized a variety of production processes over the subsequent decades of operation. Specifically, the MGP used coal and naphtha as feed stock. Naphtha, which is a flammable liquid derived by distilling crude oil, was delivered by an underground pipeline to the western side of the MGP from a railroad yard. Various forms of infrastructure were built or relocated within and around the Operations Center throughout the operation of the MGP, including naphtha tanks, lime purifier beds, sawdust purifier beds, tar wells, and at least four separate gas holders. A tail race from the Delaware and Hudson Canal passed through the site and discharged to the Delaware River. The tail race was abandoned and backfilled by 1905 and currently contains a 60-inch storm sewer line that discharges to the Delaware River.

The MGP ceased regular operations in 1938, at which time natural gas was introduced to the area. By 1959 most of the above-grade portions of the MGP-related structures had been demolished to make way for construction of the current Operations Center.

2.3 List of Project Tasks and Scope of Work

ARCADIS has been tasked with performing the following activities:

Task 1 – Site and Utility Survey

Site and utility survey activities will be performed within and around the site by ARCADIS subcontractors (and under ARCADIS oversight). Site survey activities will include the mapping of existing site features (e.g., buildings, fence lines, roadways/sidewalks, monitoring wells, paved/gravel/vegetated surfaces, etc.) and topography. Following receipt of the site survey information, ARCADIS will conduct a site walk to verify that the information provided accurately reflects existing site conditions.

In addition to the above, ARCADIS will subcontract with a private utility locator service and other parties (as appropriate) to determine the presence and location of utilities (both overhead and subsurface) within and around the site. Current known utilities at the site include overhead electrical transmission lines, a gas regulator station, subsurface natural gas distribution lines, the 60-inch storm sewer line, various municipal utilities (e.g., water, sanitary sewer, etc.), and telecommunication lines. All identified subsurface utilities will be marked at the ground surface and surveyed for location.

Task 2 – Soil Investigations (Soil Boring Installation, Test Trenching, and Soil Sampling)

Drilling activities for the soil investigations will be conducted using hollow-stem auger (HSA) methods. Soil sampling will be conducted during drilling activities. Soil samples will be visually characterized for soil type and the presence of non-aqueous phase liquid (NAPL). Select soil samples will be submitted for laboratory analysis.

Soil cuttings will be staged within the Operations Center in an appropriate container (e.g., roll-off, drum, etc.) and field screened for the presence of volatile organic vapors using a photoionization detector (PID). Soil cuttings (and other IDW) will be characterized, managed, and disposed of in accordance with applicable rules and regulations.

Test pits will also be completed at the site. Excavated materials will be visually examined and logged by the field geologist and temporarily staged on polyethylene sheeting adjacent to the test pits. Each test pit is anticipated to be advanced (if possible) to the top of the natural overburden material (located at depths ranging from approximately 5 to 10 feet below ground surface) using a rubber-tired backhoe or small excavator. The proposed test pit locations are shown on the attached Figure 1. The excavations will be sketched and photographed, as appropriate, to record significant subsurface features. Once complete, excavated materials are anticipated to be placed back into the test pits at approximately the same depth and location from which they were removed. In the event that free-phase NAPL and/or materials saturated with NAPL are encountered, those materials will be characterized, managed, and disposed of in accordance with applicable rules and regulations.

Task 3 – Groundwater/NAPL Assessment (Groundwater/NAPL Monitoring, NAPL Sampling, Soil Boring Installation, Monitoring Well Installation/Replacement, and Groundwater Sampling)

ARCADIS will conduct the following groundwater-/NAPL-related activities at the site:

- **Groundwater/NAPL Monitoring:** Monitoring activities will be completed using an oil-water interface probe or weighted, calibrated tape. At each well, groundwater levels, well depths, and NAPL thickness (if present) will be measured/recorded. If NAPL is encountered at a thickness greater than 0.1 feet in any of the monitoring wells, the NAPL will be removed (to the extent practicable) using a peristaltic pump with disposal tubing or disposable polyethylene bailers. Recovered NAPL will be containerized, characterized, managed, and disposed of in accordance with applicable rules and regulations. Any monitoring well where NAPL was removed will be periodically checked to determine whether NAPL re-accumulates and, if so, provide data to estimate the rate of recovery.
- **NAPL Sampling:** At each well where the volume of recovered NAPL is sufficient, a NAPL sample will be collected. NAPL samples will be submitted for laboratory analysis.
- **Soil Boring Installation:** Soil borings for the groundwater/NAPL assessment are anticipated to be drilled using roto sonic methods and will be used to delineate the extent of NAPL in subsurface soils located down-gradient (south) of the site. Samples collected during drilling will be screened with a PID and visually examined and logged by the on-site field geologist.

- Monitoring Well Installation/Replacement: In the event that a significant interval of NAPL-containing soil is observed during drilling, a NAPL monitoring/collection well is anticipated to be installed at that location. In addition, monitoring wells MW7 and MW8 will be overdrilled and replaced with NAPL monitoring/collection wells. It is anticipated that the overdrilling will be performed using roto-sonic methods.
- Groundwater Sampling: Groundwater sampling will be conducted using low-flow sampling procedures (e.g., a submersible pump). Groundwater samples will be submitted for laboratory analysis. Excess groundwater water will be containerized, characterized, managed, and disposed of in accordance with applicable rules and regulations. In addition to the above, Bio-Trap[®] samplers will be installed within certain monitoring wells and allowed to incubate over a period of time. Once a sufficient amount of time has passed, the Bio-Trap[®] samplers will be collected and submitted for laboratory analysis.

Task 4 – Building Assessments (Pre-Demolition and Asbestos Surveys)

ARCADIS will conduct an assessment of the loading dock and garage bay (located within the Operations Center) and vacant apartment building located on the corner of Pike and Water Streets.

The building assessments will include an asbestos survey and a survey for other regulated materials such as lead-based paint, universal wastes, and hazardous wastes, as well as above ground and underground tanks. Surveys related to demolition safety will include structural assessments, on-site utility locating, determination of utility disconnect requirements, traffic safety and control requirements, and other planning activities that may be required by local law. Should other buildings or structures be identified that require demolition or removal, the same procedures will be followed to plan and execute such actions.

Task 5 – Sediment Monitoring

Sediment monitoring will be performed within the Delaware River and will include the collection of several surface sediment samples. Sediment sampling will be conducted using a hand-held auger or Lexan tubing. Due to the coarseness of the river bottom and the presence of large cobbles and rocks, sample collection may be difficult. If necessary, cobbles and larger rocks may be moved aside to provide access to the interstitial sediment. The target depth will be six inches. All samples will be described, photographed, and shipped to an appropriate laboratory for analyses. The sediment monitoring activities will also include probing and visual characterization of sediments in the Port Jervis Outfall Area.

3. ARCADIS Organization and Responsibilities

3.1 Project Manager/Task Manager

In planning and preparation of this project, the project manager and/or task manager has completed the project-/site-specific H&S Stewardship Checklist & Project Hazard Analysis Worksheet (Appendix D). The Project Hazard Analysis Worksheet was completed using the Hazard Analysis Risk Control (HARC) ranking process (ARCADIS H&S Procedure ARC HSMS002). Additional responsibilities of the project manager and task manager are as follows:

- Review all applicable H&S Procedures, and ensure that project activities conform to all requirements.
- Obtain client-specific health and safety information and communicate with the client on health and safety issues.
- Communicate with the Site Safety Officer (SSO) on health and safety issues.
- Allocate resources for correction of identified unsafe work conditions.
- Ensure ARCADIS site workers have all training necessary for the project.
- Report all injuries, illnesses and near-misses to the Client H&S Resource or Project H&S Manager (PHSM), lead incident investigations, and ensure that any recommendations made are implemented.

3.2 Other Project Team Responsibilities

Additional personnel designated to carry out H&S job functions for the project, and their responsibilities are listed below. The same person may fill more than one role:

ARCADIS Project Team	Responsibility and Tasks
Craig Massaro	<p>Site Safety Officer (SSO)</p> <ul style="list-style-type: none"> • Reviews and works in accordance with the components of this HASP. • Ensures that this HASP is available to and reviewed by all site personnel including subcontractors. • Ensures that necessary site-specific training is performed (both initial and “tailgate” health and safety briefings). • Ensures site visitors have been informed of the hazards related to ARCADIS work, and have signed the Visitor Acknowledgement and Acceptance of HASP Signature Form (Appendix B). • Ensures that work is performed in a safe manner and has authority to stop work when necessary to protect workers and/or the public. • Coordinates activities during emergency situations. • Ensures that all necessary permits and safety information provided by the client is disseminated to other site personnel and is maintained in an organized manner. • Communicates with the PM, Client H&S Resource and/or the PHSM on health and safety issues. • Reports all injuries, illnesses and near-misses to the PM, Client H&S Resource and PHSM. • Ensures that necessary safety equipment is maintained and used at the site. • Contacts a health and safety professional for assistance in establishing the respiratory cartridge change schedule as required.
To Be Determined	<p>Site Workers</p> <ul style="list-style-type: none"> • Reads and works in accordance with the components of this HASP. • Reports all unsafe working conditions to the SSO. • Reports all injuries, no matter how minor, to the SSO. • Works in a safe manner. • Signs the HASP Employee Signature Form in Appendix C.

ARCADIS Project Team	Responsibility and Tasks
<p>Charles Webster</p>	<p>Project H&S Manager (PHSM)</p> <p>The PHSM oversees all aspects of the site safety program, and prepares site-specific health and safety guidance documents or addenda to this plan. The PHSM does not report to the Project Manager, and is separately accountable to the ARCADIS project team for site health and safety. The PHSM acts as the sole contact to regulatory agencies on matters of safety and health. Other responsibilities include:</p> <ul style="list-style-type: none"> • Overall authority for health and safety compliance and HASP conformance for the project. • General health and safety program administration. • Conducts project health and safety audits as warranted. • Determines the level of personal protection required. • Updates equipment or procedures based on information obtained during site operations. • Establishes air-monitoring parameters based on expected contaminants. • Assists in injury, illness and near-miss investigations and follow-up.
<p>Wayne Bergin</p>	<p>Client H&S Resource</p> <p>The designated Client H&S Resource is responsible for :</p> <ul style="list-style-type: none"> • Assisting the SSO in issues as they arise. • Performing site audits and assessments. • Assisting with near-miss/incident investigations. • Serves as the liaison with corporate during H&S regulatory issues as they may arise.

4. Hazard Control

Figure 2. HARC - Risk Assessment Matrix (H&S Procedure ARCHSMS002)

Risk Assessment Matrix		Likelihood Ratings				
Consequences Ratings		A	B	C	D	E
People	Property	Never heard of in the world	Heard of incident in industry	Incident has occurred in ARCADIS Group	Happens several times a year in ARCADIS OpCo	Happens several times a year at ARCADIS Worksite
0 - No health effect	0 - No damage	Low	Low	Low	Low	Low
1 - Slight health effect	1 - Slight damage	Low	Low	Low	Low	Low
2 - Minor health effect	2 - Minor damage	Low	Low	Low	Medium	Medium
3 - Major health effect	3 - Local damage	Low	Low	Medium	Medium	High
4 - PTD or 1 fatality	4 - Major damage	Low	Medium	Medium	High	High
5 - Multiple fatalities	5 - Extensive damage	Medium	Medium	High	High	High

4.1 Job Loss Analyses, H&S Procedures, and PPE

Job Loss Analyses (JLAs) have been completed for the safety-critical tasks to be performed under this HASP. Those JLAs (included in Appendix E) outline the control methods to protect employees and property from the project-/site-specific hazards identified on the Project Hazard Analysis Worksheet (Appendix D). The ARCADIS Field H&S Handbook (discussed below in Section 4.2) provides additional information regarding hazard controls and health and safety best practices/principles.

The JLAs also list the required and/or recommended personal protective equipment (PPE) for each safety-critical task. A detailed checklist of PPE for the project is located in Appendix F.

ARCADIS H&S Procedures applicable to this project are listed below and are also provided in Appendix E. These procedures should be reviewed by the project manager, task manager, and site personnel. The Client H&S Resource should be contacted with any questions concerning the procedures.

- ARCHSCS005 – Excavation and Trenching
- ARCHSFS007 – Lead
- ARCHSFS019 – Utility Location

- ARCHSGE001 – Tailgate Health and Safety Meetings
- ARCHSGE015 – Personal Protection Equipment
- ARCHSIH003 – Benzene
- ARCDOT301 – Public Roadway Work Zone Safety
- ARCDOT302 – Private Roadway Work Zone Safety

In addition, the O&R Safety Guideline SG 1026.2 for Excavation and Trenching is also provided in Appendix E.

4.2 Field H&S Handbook

The Field H&S Handbook is an ARCADIS document containing information about topic-specific health and safety requirements for the field. This handbook contains relevant general topics and is used as part of the overall HASP process. To aid in the consistency of the HASP process, the handbook will be used as an informational source in conjunction with this HASP. The following handbook sections are required reading for this project:

- Section III-B. Department of Transportation – HAZMAT Transportation/Dangerous Goods
- Section III-C. First-aid/CPR
- Section III-D. Blood-borne Pathogens
- Section III-F. General Housekeeping, Personal Hygiene and Field Sanitation
- Section III-G. Site Security, Work Zone and Decontamination for HAZWOPER Sites
- Section III-I. Severe Weather
- Section III-K. Hazard Communication
- Section III-L. Noise

- Section III-M. Heat and Cold Stress
- Section III-N. Biological Hazards
- Section III-O. Illumination
- Section III-R. Personal Protective Equipment
- Section III-U. Driving
- Section III-X. Boating Operations Safety
- Section III-CC. Hand and Power Tools
- Section III-EE. Ergonomics
- Section III-GG. HAZWOPER and HAZMAT Response
- Section III-II. Drums and Other Material Handling
- Section III-KK. Signs, Signals and Barricades
- Section III-LL. Traffic Control
- Section III-MM. Utility Location
- Section IV-D. Excavation/Trenching
- Section IV-E. Heavy Equipment
- Section IV-H. Concrete and Masonry
- Section IV-L. Temporary Working Surfaces
- Section V-G. Water Operations Work
- Section V-I. Industrial Hygiene and Monitoring Equipment

5. Hazard Communication

All project required chemicals must be handled in accordance with OSHA 29 CFR 1910.1200, ARCADIS-Hazard Communication (HazCom) Procedure (ARC HSGE007), and the requirements outlined in the Field H&S Handbook. Table 1 lists chemicals that may be brought and stored on the site. Material Safety Data Sheets (MSDS) for site constituents of concern as well as chemicals anticipated to be brought on site are included in Appendix G.

Table 1. Master Chemical and Storage List

Chemical Name	Estimated Quantity	Chemical Storage Location
Hydrochloric Acid (HCL)	~50 mL	Sample vials in coolers
Nitric Acid (HNO ₃)	~50 mL	Sample vials in coolers
Sodium Hydroxide (NaOH)	~50 mL	Sample vials in coolers
Sulfuric Acid (H ₂ SO ₄)	~50 mL	Sample vials in coolers
Trisodium Phosphate	~50 mL	Sample vials in coolers
Zinc Acetate	~50 mL	Sample vials in coolers
Lumber Crayons	As needed	In appropriate tanks/containers
Survey Paint	As needed	In appropriate tanks/containers
Alconox	As needed	In appropriate tanks/containers
Act 22	As needed	In appropriate tanks/containers
Peak 20 Degree Wash	As needed	In appropriate tanks/containers
Enviroplu Medium	As needed	In appropriate tanks/containers
Enviroplug No. 16	As needed	In appropriate tanks/containers
BioSolve	As needed	In appropriate tanks/containers
Blacktop Patch	As needed	In appropriate tanks/containers
Concrete Mix	As needed	In appropriate tanks/containers
Diesel Fuel	As needed	In appropriate tanks/containers
Gasoline (Unleaded)	As needed	In appropriate tanks/containers
Grease	As needed	In appropriate tanks/containers
Kerosene Burner Fuel	As needed	In appropriate tanks/containers
Portland Cement	As needed	In appropriate tanks/containers
Propane	As needed	In appropriate tanks/containers

5.1 Chemical Hazards

Air monitoring will be conducted as outlined in this HASP to collect exposure data for chemicals of concern or for chemicals brought on site for use. Table 2 lists the properties of chemicals that may be encountered at the site.

Table 2. Chemical Hazard Information

Chemical Name	IP (eV)	Odor Threshold (ppm)	Routes of Entry/ Exposure Symptoms	8-hr TWA ¹ (ppm)	IDLH (NIOSH) (ppm)	STEL (ppm)	Source TLV/PEL
Benzene	9.24 eV	1.5 ppm	Inhalation, Skin Absorption, Ingestion, Skin/Eye Contact. Irritation to the eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude (weakness, exhaustion); dermatitis; bone marrow depression; [potential occupational carcinogen]	0.5 ppm	500 ppm	2.5 ppm	TLV
Ethylbenzene	8.76 eV	2.3 ppm	Inhalation, ingestion, skin and/or eye contact. Irritation to the eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma.	100 ppm	800 ppm	125 ppm	TLV
Toluene	8.82 eV	2.9 ppm	Irritation to the eyes and nose; lassitude (weakness, exhaustion) confusion, euphoria, dizziness, headache, dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage.	20 ppm	500 ppm	300 ppm	TLV
Xylene	8.44 eV	1 ppm	Inhalation, Absorption, Ingestion, Contact with Skin/Eyes. Irritation to the eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait, corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis.	100 ppm	900 ppm	150 ppm	TLV
Naphthalene	8.12 eV	0.84 ppm	Inhalation, Ingestion, Absorption, Contact with Skin/Eyes. Irritation to the eyes; headache, confusion, excitement, malaise (vague feeling of discomfort); nausea, vomiting, abdominal pain; irritated bladder; profuse sweating; jaundice; hematuria (blood in the urine), renal shutdown; dermatitis, optical neuritis, corneal damage.	10 ppm	250 ppm	15 ppm	TLV

Chemical Name	IP (eV)	Odor Threshold (ppm)	Routes of Entry/ Exposure Symptoms	8-hr TWA ¹ (ppm)	IDLH (NIOSH) (ppm)	STEL (ppm)	Source TLV/PEL
Polycyclic Aromatic Hydrocarbons (PAHs)	NA	NA	Inhalation, Ingestion, Absorption, Contact with Skin/Eyes. Animal studies have also shown that PAHs can cause harmful effects on the skin, body fluids, and ability to fight disease after both short- and long-term exposure. But these effects have not been seen in people.	0.2 mg/m ³	NA	NA	PEL
Cyanide	NA	NA	Inhalation, Ingestion, Skin/Eye Contact. Asphyxia and death can occur, preceded by seizures, coma with abolished deep reflexes and dilated pupils, weakness; paralysis; dizziness; numbness; anxiety; chest tightness; irregular heartbeat; shortness of breath; confusion; headache; sore throat; nausea, vomiting; eye irritation; rash, chemical burns on skin; enlargement of thyroid gland.	5 mg/m ³	25 mg/m ³	NA	PEL

¹The TLV (Threshold Limit Value) from the American Conference of Governmental Industrial Hygienists (ACGIH) is listed unless the PEL (Permissible Exposure Limit), designated by OSHA, is lower.

See Section 7 for information on air monitoring requirements.

6. Tailgate Meetings

Tailgate health and safety briefings will be conducted at least daily at the beginning of the work day, or as tasks/hazards change. Information specified on the form included in Appendix H will be used during each tailgate health and safety briefing. Discussions during these briefings will be documented on this form and/or the task specific/dedicated field books.

7. Personal Exposure Monitoring and Respiratory Protection

Personal and area exposure monitoring will be documented on the Real Time Exposure Monitoring Data Collection Form provided in Appendix I or task specific/dedicated field books. All monitoring equipment will be maintained and calibrated in accordance with manufacturer’s recommendations. All pertinent monitoring data will be logged on the form or in the field book and maintained on site, or at the primary ARCADIS office, for the duration of project activities. Calibration of monitoring equipment will be conducted at the beginning of each day’s use, and/or as conditions change and logged on the same form or field book.

Table 3 lists exposure monitoring requirements and associated action levels for site exposure hazards (e.g. chemical, noise, radiation, etc).

Table 3. Exposure Monitoring Requirements

TASK 1 – Is exposure monitoring required for the completion of this project? <input type="checkbox"/> YES <input checked="" type="checkbox"/> NO If yes, complete the following:				
Exposure Hazard	Monitoring Equipment	Monitoring Frequency	Action Level	Required Action
NA	NA	NA	NA	NA
TASKS 2, 3, 4, 5 – Is exposure monitoring required for the completion of this project? <input checked="" type="checkbox"/> YES <input type="checkbox"/> NO If yes, complete the following:				
Total Hydrocarbons	Photo ionization detector (PID) (10.6 eV lamp or greater)	Continuous in breathing zone/Work zone perimeter	≤ 0.5 ppm > 0.5 ppm > 0.5 ppm, ≤ 20 ppm > 20 ppm ≥ 200 ppm	Normal operations Begin Monitoring for benzene with colorimetric tubes Normal operations Upgrade to level C PPE Stop work and investigate cause of reading; contact SSO/PM

Exposure Hazard	Monitoring Equipment	Monitoring Frequency	Action Level	Required Action
Benzene	Colorimetric tube	As dictated by total hydrocarbons action level above	<p>≤ 0.5 ppm</p> <p>> 0.5 ppm, ≤ 1.0 ppm</p> <p>> 20.0 ppm</p>	<p>Normal operations</p> <p>Upgrade to level C PPE</p> <p>Stop work and investigate cause of reading; contact SSO/PM</p>
Particulate	MIE PDR 1000 Data RAM	Continuous in breathing zone/Work zone perimeter	0.5 mg/m ³ (sustained for 5 minutes)	Institute wetting procedures. If wetting techniques fail to keep below action level, Stop Work. Contact SSO/PM. If exceedences continue reassess hazards/implement engineering controls.
Oxygen	Multi-Gas Meter	Continuous in breathing zone Prior and during excavation entry	<p>≤ 19.5%</p> <p>> 19.5% to < 23.5%</p> <p>≥ 23.5%</p>	<p>Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area</p> <p>Normal operations</p> <p>Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area</p>
Carbon Monoxide	Multi-Gas Meter	Continuous in breathing zone Prior and during excavation entry	<p>0 ppm to ≤ 20 ppm</p> <p>> 20 ppm</p>	<p>Normal operations</p> <p>Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area</p>

Exposure Hazard	Monitoring Equipment	Monitoring Frequency	Action Level	Required Action
Hydrogen Sulfide	Multi-Gas Meter	Continuous in breathing zone Prior and during excavation entry	0 ppm to ≤ 5 ppm > 5 ppm	Normal operations Stop work, evacuate confined spaces/work area, investigate cause of reading, and ventilate area
Flammable Vapors (LEL)	Multi-Gas Meter	Continuous in breathing zone Prior and during excavation entry	< 10% LEL ≥ 10% LEL	Normal operations Stop work, ventilate area, investigate source of vapors

7.1 Respirator Cartridge Change Schedule

With the exception of protection against particulates*, if the action plan outlined above calls for an upgrade to an air-purifying respirator (for protection against organic vapors and other gaseous chemicals), the following will apply:

- The respirator cartridge will be equipped with an end-of-service-life indicator (ESLI) certified by NIOSH for the contaminant; or
- If there is no ESLI appropriate for a contaminant, the project will implement a change schedule for cartridges to ensure that they are changed before the end of their service life.

In general, air-purifying respirator cartridges must be replaced at the expiration of its service life or at the end of each shift, whichever comes first. If an exposure to any one of the organic vapors and other gaseous chemicals is in excess of their respective PEL and the cartridge is not equipped with an ESLI, then a Cartridge Change Schedule must be developed. The project's SSO must contact the Client H&S Resource to develop the schedule.

**Note – A Cartridge Change Schedule is not necessary for cartridges used in the protection against particulates provided that the cartridges are changed out when there is a perceived resistance in breathing experienced by the user.*

8. Medical Surveillance

Medical surveillance requirements for the project are provided on the Project Manager/Task Manager H&S Stewardship Checklist & Project Hazard Analysis Worksheet (Appendix D). All medical surveillance requirements as indicated on the worksheet must be completed and site personnel medically cleared before being permitted on the project site.

9. General Site Access and Control

The SSO will coordinate access and control security at the work site. As the work dictates, the SSO will establish a work area perimeter. The size of the perimeter will be based on the daily task activities and will be discussed with all project personnel during the tailgate meeting and then documented on the tailgate meeting form, or the field book. Control zones for Level C or above will be demarcated by either visual or physical devices and will be monitored for effectiveness by the SSO.

Only authorized personnel will be allowed beyond the perimeter. Other site workers and visitors to the site should be kept out of the work site. If visitors need access to the site, the SSO will escort the visitor at all times. All visitors will log in and out with the SSO. The Visitor Acknowledgement and Acceptance of HASP Signature Form is included in Appendix B.

10. Decontamination Control Zones and Procedures

Part of the required reading for this HASP includes reviewing the Field H&S Handbook, Section III-G Site Security, Work Zone and Decontamination for HAZWOPER Sites.

The decontamination procedures outlined in the Field H&S Handbook are provided for typical Level D and Level C ensembles.

The zones for Level C and above will be designated by traffic cones, barricades, signs, caution tape, or other means effective in identifying the different areas. The SSO will establish control boundaries for the exclusion zone, contamination reduction zone, and the support zone. The zones will be identified by the SSO during tailgate meetings and documented on the meeting form, or the field book. Entrance and exit to the exclusion zone will only be through controlled access points established for each work area.

11. Emergency Action Plan

In the event that an injury, over-exposure or spill has occurred, an Emergency Action Plan (EAP) will be implemented. Appendix J provides the EAP, notifications for the project, and route from the site to the nearest hospital. All employees working on this project must be shown the location and proper use of all emergency equipment prior to beginning work on the project.

12. Client-Specific Health and Safety Requirements

ARCADIS project personnel must comply with the client's specific H&S requirements at all times. Client-specific H&S requirements are as follows:

- Contractors working in conjunction with O&R personnel, shall follow all O&R safety and environmental rules (in addition to the safety and environmental practices already stated in the O&R Safety Guideline located in Appendix K) so that continuity of safety and environmental protection is maintained within the scope of the job being performed.
- The O&R Safety Guideline is to serve as a handout to contractors retained by O&R. The O&R Contractor Representative (Coordinator) responsible for the contractor shall become familiar with this material for all appropriate action and enforcement.
- The contractor is responsible for supplying PPE to its employees and to ascertain that its personnel wear any protective equipment that is required by federal, state and local laws, and Company rules and regulations. It is O&R's policy that protective equipment SHALL NOT be loaned to contractor personnel.
- The contractor and its representatives are responsible for complying with all posted warning signs relating to PPE, on or at any O&R facilities. At a minimum, Hard Hats, Safety Glasses, Hi Visibility vests or apparel and protective toed shoes shall be worn when leaving the protection of the vehicle.
- All contractors working are required to wear non-synthetic clothing. Clothing must not have any screening and be of a natural fiber. Contractors working on or in proximity to energized sources in locations such as Office facilities, warehouses, garages, sheds etc. will comply with the apparel requirements of NFPA 70E. In other locations such as substations, contractors will be required to comply with O&R's clothing program.
- When contractor personnel have an accident, which involves: the public, results in an injury, electrical contact at O&R's facilities, any significant gas-related accident or affects the environment, the assigned O&R Contractor Representative (Coordinator) must be notified immediately. This person in turn, will notify the Safety, Risk Management and Environmental Services Departments, as appropriate, for the incident. Incidents that did not cause injury or property damage, but easily could have, are to be reported as well. Written notification shall occur within 24 hours of the incident.

- A list of emergency phone numbers is included in the Emergency Action Plan (Appendix J).
- Mark outs are required when digging, drilling, excavation or other earth disturbances are performed.

13. Department of Transportation Dangerous Goods Shipping Requirements

ARCADIS has policies in place for transporting small quantities of hazardous materials and for offering for shipping via ground or air. These policies are designed to meet the applicable requirements. As such, only ARCADIS staff that have been trained in the proper methods to prepare and ship hazardous materials are authorized to do so. Tasks associated with the packaging, labeling, marking, and preparation of hazardous materials for shipping or transport must have all appropriate and applicable training.

13.1 Materials of Trade

The Department of Transportation (DOT) allows for a small amount of hazardous materials that are used in or an inherent part of our work to be transported in company vehicles. This includes things like gasoline, paint, small compressed gas cylinders, calibration gas, etc. To transport these:

- Staff will complete Materials of Trade (MOT) training.
- Vehicles used in transportation to and from off-site work locations will be in conformance with ARCADIS vehicle safety procedures.

Hazardous materials will be transported as described above as a result of the activities covered in this HASP. Site personnel who transport materials mentioned above will complete the Hazardous Materials Transportation Form included in Appendix L.

13.2 Department of Transportation

Staff who collect, prepare, package, mark, label, complete shipping declarations, offer shipments to a transporter, directly transport or are engaged in other activities associated with the transportation of Hazardous Materials (referred to as Dangerous Goods in Canada and by the International Air Transport Association [IATA]) will have appropriate and applicable training. DOT requires all individuals who participate in hazmat shipping including activities such as completing the paperwork (but not signing it), filling a container with a hazardous material (including filling a drum with drill cuttings or purge water), marking, labeling, and packaging the hazardous material, etc., have awareness level training on the DOT requirements. DOT requires additional job function training for those who conduct specific activities including:

- Staff who have to sign shipping papers or manifests, are listed as the 24-hour emergency contacts on shipping and have the responsibility for identifying, classifying, packaging, marking, and labeling HazMat packages, and/or are directing or overseeing others who do these tasks will become certified through the completion of additional training.
- The above training allows the offering employee to ship only by ground. If the shipment is to be offered for air transport, additional training is required.

Shipments as described above will be made as a result of the activities covered in this HASP. Site personnel shipping hazardous materials will complete the Hazardous Materials Shipment Form included in Appendix M.

14. Loss Prevention System™ and Loss Prevention Observations

As part of any project, no matter how simple or complex, Loss Prevention Observations (LPOs) should be conducted when practical and when able to integrate into normal business activities. LPOs should be scheduled based on the risk of the tasks being performed, and should be conducted for different tasks and at different times. Completion of LPOs should be documented on the Tailgate Health and Safety Briefing Form (Appendix H). The following table outlines the LPO plan for the project:

Identified Task for LPO	Schedule Date	Observer Name	Observee Name	Feedback Supervisor Name

15. Subcontractors

A copy of this HASP will be provided to all ARCADIS subcontractors performing on-site activities prior to the start of work so that the subcontractor is informed of the hazards at the site. ARCADIS' subcontractors performing on-site activities will operate under this HASP. Copies of any required safety documentation for a subcontractor's work activities will be provided to ARCADIS for review prior to the start of on-site activities.

Subcontractors working at the site will need to have this plan with them, and will also need to sign the Subcontractor Acknowledgement: Receipt of HASP Signature Form of the ARCADIS HASP (Appendix N). Subcontractors are responsible for the H&S of their employees at all times, and have the authority to halt work if unsafe conditions arise.

The Project/Task Manager and SSO (or authorized representative) has the authority to halt the subcontractor's operations and to remove the subcontractor or subcontractor's employee(s) from the site for failure to comply with established health and safety procedures or for operating in an unsafe manner.

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Figure

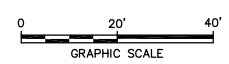
CITY: SYRACUSE DIV/GROUP: ENV141 DB: L FORAKER K WOOD K DAVIS LD: PIC: M CARREILLO-SHERIDAN PIR: A CORBIN LVR: ONL-OFF-REF: X01 CONTROL: HISTORICAL: G:\ENVCAD\SYRACUSE\ACT\B004302\1000\0000\DWG\G\REPORT\3021G01.dwg LAYOUT: 1 SAVED: 3/29/2010 10:03 AM ACADVER: 17.05 (LMS TECH) PAGES: 1 PLOT: PLT FULL CTB PLOTTED: 3/29/2010 10:03 AM BY: GETTIS, BRIAN



LEGEND:

- PROPERTY LINE (APPROXIMATE)
- x- EXISTING CHAIN LINK FENCE
- █ EXISTING STRUCTURE/BUILDING
- - - 60-INCH-DIAMETER STORM SEWER LINE (APPROXIMATE)
- - - HISTORICAL SITE FEATURE
- ▭ 2-FOOT EXCAVATION
- ▭ 3-FOOT EXCAVATION
- ▭ 5- TO 12-FOOT EXCAVATION
- ▭ 20-FOOT EXCAVATION
- ◆ SS4 SURFACE SOIL SAMPLE LOCATION
- ▲ SB1 SOIL BORING LOCATION
- ⊕ MW145 MONITORING WELL LOCATION
- ⊕ LTWP1 TEMPORARY WELL LOCATION (NO LONGER EXISTING)
- ⊗ LSG8 SOIL GAS OR SUB-FLOOR SOIL GAS SAMPLE LOCATION
- PDI-SB3 PROPOSED SOIL BORING LOCATION (SEE NOTES 4 & 5)
- ▭ PDI-TP3 PROPOSED TEST PIT LOCATION (SEE NOTE 4)

- NOTES:**
1. BASEMAP MODIFIED FROM DRAWINGS PORT_JERVIS_08.DWG AND FIGURE 3-1_SELECTED_REMEDY.DWG PROVIDED BY AECOM.
 2. ALL LOCATIONS, PROPERTY BOUNDARIES, AND SITE FEATURES ARE APPROXIMATE.
 3. EXCAVATION LIMITS ARE CONCEPTUAL.
 4. PROPOSED SOIL BORING/TEST PIT LOCATIONS MAY BE REPOSITIONED IN THE FIELD BASED ON ACCESSIBILITY, OBSTRUCTIONS ENCOUNTERED, AND OTHER FACTORS.
 5. ADDITIONAL SOIL BORINGS MAY BE INSTALLED BASED ON CONDITIONS ENCOUNTERED IN THE FIELD.



PORT JERVIS FORMER MGP SITE
ORANGE AND ROCKLAND UTILITIES, INC.
PORT JERVIS, NEW YORK

**PROPOSED SOIL BORING
AND TEST PIT LOCATIONS
FOR SOIL INVESTIGATION**



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Appendices

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Appendix A

HASP Addendum Page and
Log Table

Addendum Page

This form should be completed for new tasks associated with the project. The project manager and/or task manager should revise the Project Hazard Analysis Worksheet with the new task information and attach to this addendum sheet. Job Safety Analyses (JSAs) should be developed for any new tasks and attached as well.

Review the addendum with all site staff, including subcontractors, during the daily tailgate health and safety briefing, and complete the associated form as required. Attach a copy of the addendum to all copies of the HASP including the site copy, and log in the Addendum Log Table A-1 on the next page.

Addendum Number: _____ Project Number: _____

Date of Changed Conditions: _____ Date of Addendum: _____

Description of Change that Results in Modifications to HASP:

Signed: _____
Project Manager

Signed: _____
Site Safety Officer

Signed: _____
H&S Plan Writer

Signed: _____
H&S Plan Reviewer

Addendum Log Table

Addendums are to be added to every copy of the HASP, and logged on Table A-1 to verify that all copies of the HASP are current:

Table A-1 Addendum Log Table

Addendum Number	Date of Addendum	Reason for Addendum	Person Completing Addendum
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			

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Appendix B

Visitor Acknowledgement and
Acceptance of HASP Signature
Form

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Appendix C

Employee Signature Form

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Appendix D

H&S Stewardship Checklist &
Project Hazard Analysis
Worksheet

ARCADIS US Project Manager and Task Manager/Principal-In-Charge H&S Stewardship Checklist

Project Hazard Analysis Page

Project Name:	Port Jervis Former MGP Site	Project Number:	B0043021
Client:	Orange and Rockland Utilities, Inc.	Principal-In Charge:	Margaret Carrillo-Sheridan
Project / Task Manager:	Andrew Corbin	Completed By:	Michael Benoit
		Date:	16-Mar-10

ARCADIS Project Hazard Analysis Worksheet

TRACK

Recognize and **A**ssess the Hazards for the Project

For each potential hazard, determine the worst case conditions for the entire project and all of the tasks and assess them using High (H), Medium (M), Low (L). Use the drop down list in each "Assess" cell. If a hazard is not expected on the site, leave the "Assess" box blank.

	Recognize the Hazards	Assess	Recognize the Hazards	Assess	List Types of other Physical Hazards Below
Physical Hazards:	Heat	Low	Holes/Pits	Medium	
	Cold	Low	Ionizing Radiation		
	Noise	Medium	Non-ionizing Radiation		
	Walking/Working surfaces (includes slip/trip/fall & floor/wall openings)	High	Electricity	Medium	
	Visible Dust	Medium	Poor lighting	Low	
	LASER		Severe Weather	Low	
	Other:		Overhead Hazards	Medium	
	Other:		None: Mark with an "X"		

Control the Hazard:

General controls for the Physical Hazards identified above are outlined in the Field H&S Handbook and (specific to the activities to be performed under this HASP) in the Job Loss Analyses provided in Appendix E.

				List the Names of the Major Chemicals Below
Chemical Hazards:	Flammable/Combustible	Medium	Corrosive	
	Compressed gas		Toxic	
	Explosive		Highly toxic	
	Organic peroxide		Irritant	
	Oxidizer		Sensitizer	
	Water reactive		Carcinogen	Medium
	Unstable reactive		Mutagen	
	Dust/Fumes/Particulates	Medium	None: Mark with an "X"	

Control the Hazard:

General controls for the Chemical Hazards identified above are outlined in the Field H&S Handbook and (specific to the activities to be performed under this HASP) in the Job Loss Analyses provided in Appendix E.

				List Types of Other Environmental / Equipment Hazards Below
Environmental/ Equipment Hazards:	Heavy machinery	High	Cranes/Hoists/Rigging	
	Trenching/excavation	High	Ladders	
	Docks – marine operations	Medium	Scaffolding	
	Construction activities	High	Manlifts	
	Diving operations		Welding	
	Drilling	High	Gas cylinders	
	Forklifts		Roadway work	
	Water operations work	Medium	Railroad work	Medium
	Heights (fall protection)		Mining work	
	Overhead/ Underground utilities	High	Energized / Pressurized equip (LO/TO)	Medium
	Confined spaces		Drums and containers	Medium
	Power tools	Medium	Other	
	Other:		None: Mark with an "X"	

Control the Hazard:

General controls for the Environmental/Equipment Hazards identified above are outlined in the Field H&S Handbook and (specific to the activities to be performed under this HASP) in the Job Loss Analyses provided in Appendix E.

ARCADIS US Project Manager and Task Manager/Principal-In-Charge H&S Stewardship Checklist

Project Hazard Analysis Page

Project Name:	Port Jervis Former MGP Site	Project Number:	B0043021
Client:	Orange and Rockland Utilities, Inc.	Principal-In Charge:	Margaret Carrillo-Sheridan
Project / Task Manager:	Andrew Corbin	Completed By:	Michael Benoit
		Date:	16-Mar-10

ARCADIS Project Hazard Analysis Worksheet

TRACK

Recognize and **A**ssess the Hazards for the Project
 For each potential hazard, determine the worst case conditions for the entire project and all of the tasks and assess them using High (H), Medium (M), Low (L). Use the drop down list in each "Assess" cell. If a hazard is not expected on the site, leave the "Assess" box blank.

Biological Hazards	Animal/Human fluids or blood	Low	Contaminated Needles		List Types of Other Biological Hazards Below
	Animal/Human tissue(s)		Live Bacterial Cultures		
	Poisonous/irritating plants	Low	Insects/rodents/snakes	Low	
	Other:		None: Mark with an "X"		

Control the Hazard:
 General controls for the Biological Hazards identified above are outlined in the Field H&S Handbook and (specific to the activities to be performed under this HASP) in the Job Loss Analyses provided in Appendix E.

Ergonomic Hazards	Repetitive motion	Low	Limited movement	Low	List Types of Other Ergonomic Hazards Below
	Awkward position	Low	Forceful exertions		
	Heavy lifting	Low	Vibration	Low	
	Frequent lifting	Low	Other:		
	Other:		None: Mark with an "X"		

Control the Hazard:
 General controls for the Ergonomic Hazards identified above are outlined in the Field H&S Handbook and (specific to the activities to be performed under this HASP) in the Job Loss Analyses provided in Appendix E.

Personal Safety/Security	Personal safety	Low	Employees working early/late	Low	List Types of Other Personal Safety / Security Hazards Below
	Security issue		Potentially dangerous wildlife		
	Project site in isolated area		Guard or stray dogs in area		
	Employees working alone	Low	No/limited cell phone service		
	Fatigue	Low	Other:		
	Other:		None: Mark with an "X"		

Control the Hazard:
 General controls for the Personal Safety/Security Hazards identified above are outlined in the Field H&S Handbook and (specific to the activities to be performed under this HASP) in the Job Loss Analyses provided in Appendix E.

Driving Safety	Driving early/late	Low	City driving	Low	List Types of Other Driving Hazards Below
	Driving long trips	Low	Pulling a trailer		
	Driving off-road		ATV driving:		
	Bad weather driving	Low	Other:		
	Other:		None: Mark with an "X"		

Control the Hazard:
 General controls for the Driving Safety Hazards identified above are outlined in the Field H&S Handbook and (specific to the activities to be performed under this HASP) in the Job Loss Analyses provided in Appendix E.

ARCADIS US Project Manager and Task Manager/Principal-In-Charge H&S Stewardship Checklist

Project Hazard Analysis Page

Project Name:	Port Jervis Former MGP Site	Project Number:	B0043021
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Project / Task Manager:	Andrew Corbin	Completed By:	Michael Benoit
		Date:	16-Mar-10

ARCADIS Project Hazard Analysis Worksheet

TRACK

Recognize and **A**ssess the Hazards for the Project

For each potential hazard, determine the worst case conditions for the entire project and all of the tasks and assess them using High (H), Medium (M), Low (L). Use the drop down list in each "Assess" cell. If a hazard is not expected on the site, leave the "Assess" box blank.

					List Types of Other Training Required Here
Training Required	40 hour HAZWOPER	Yes	Bloodborne pathogens	No	
	24 hour HAZWOPER	No	Confined space	No	
	HAZWOPER site supervisor	No	Lockout/tagout	No	
	OSHA 30 hour Construction	No	Electrical Safety	No	
	OSHA 10 hour Construction	No	Fire Extinguishers	Yes	
	PPE	Yes	Fall Protection	No	
	Respiratory protection	Yes	Noise exposure	No	
	Chemical hygiene	No	Forklifts	No	
	Hazard communication	Yes	Asbestos (training required for Building Assessments only)	Yes	
	Hazardous waste	No	Lead (training required for Building Assessments only)	Yes	
	First-aid/CPR	Yes	Cadmium	No	
	DOT/IATA hazmat transportation	Yes	SPCC	No	
	MSHA	No	Radiation safety	No	
Diving	No	Client specific	No		
FRA	No	None: Mark with an "X"			
Medical Screening	Medical Surveillance Exam (HAZWOPER)	Yes	Other hazardous substance	No	List Types of other Medical Screening Here
	Pulmonary Function Test if wearing respirator and employee not part of HAZWOPER		Audiometric test if noise is a hazard and employee not part of HAZWOPER	No	
	Client required drug and/or alcohol testing	No	Blood and/or urine screening	No	
	Hepatitis B Immunization (or declination on file)	No	None: Mark with an "X"		

Keep Safety First In All Things

Appendix E

JLAs and Procedures

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JLAs

Job Loss Analysis

General

Client Name	ORANGE & ROCKLAND UTILITIES, INC.
JSA ID	1862
Job Name	Environmental-Drilling, soil sampling, well installation
Task Description	Drilling with Drill Rig
Project Number	B00430210000
Project Name	PORT JERVIS FORMER MGP SITE
PIC Name	CARRILLO-SHERIDAN, MARGARET
Project Manager	CORBIN, ANDREW
Status Name	(3) Completed
Creation Date	3/16/2010 9:18:47 AM

User Roles

Role	Employee	Due Date	Completed	Approve	Supervisor	Active Employee
Created By	Benoit, Michael	4/6/2010	3/16/2010		Corbin, Andrew	True

Job Steps

Job Step	Job Step Description	Potential Hazard	Critical Action	HSP 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 aboveground utilities while drilling	Complete utility clearance in accordance with the ARCADIS H&S procedure	ARCADIS H&S Procedure 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. W operation as practicable. Wear appropriate gloves to protect from COCs.	

3	General drill rig operation	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 Location H&S policy and procedure 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.	
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 debris 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 debris damage to paint or windshields.	
		2	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.	
		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 creation and/or dust masks 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	

7	Reverse rotary drilling	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.

9	Direct push drilling	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.	Preferably let the driller cut the sleeves open. Many drillers have holders for the sleeve to allow for stability when cutting. If we cut the sleeves, use a hook blade, change blade regularly, and cut away from the body.	
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 JLA
		2	lifting heavy coolers can cause back injuries	Use two people to move heavy coolers. Use proper lifting techniques.	Sample cooler handling JLA
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 JLA

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)		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
Respiratory Protection	dust mask		Recommended

Supplies

Type	Supply	Description	Required
Communication Devices	mobile phone		Required
Decontamination	Decon supplies (specify type)		Required
Miscellaneous	fire extinguisher		Required
Miscellaneous	first aid kit		Required
Personal	eye wash (specify type)	bottle	Required
Traffic Control	traffic cones		Required

Job Loss Analysis

General

Client Name	ORANGE & ROCKLAND UTILITIES, INC.
JSA ID	1877
Job Name	Environmental-Groundwater Sampling and free product recovery
Task Description	Groundwater Sampling and Free Product Recovery
Project Number	B00430210000
Project Name	PORT JERVIS FORMER MGP SITE
PIC Name	CARRILLO-SHERIDAN, MARGARET
Project Manager	CORBIN, ANDREW
Status Name	(3) Completed
Creation Date	3/16/2010 2:20:39 PM

User Roles

Role	Employee	Due Date	Completed	Approve	Supervisor	Active Employee
Created By	Benoit, Michael	4/6/2010	3/16/2010		Corbin, Andrew	True

Job Steps

Job Step	Job Step Description	Potential Hazard	Critical Action	HSP Reference
1	Stage at pre-determined sampling location and set up work zone and sampling equipment	1 personnel could be hit by vehicular traffic.	Set-up cones and establish work area. Position vehicle so that field crew is protected from site traffic. Unload as close to work area as safely possible.	
		2 Sampling equipment, tools and monitoring well covers can cause tripping hazard	Keep equipment picked up and use TRACK to assess and changes	
2	Open wells to equilibrate and gauge wells	1 When squatting down, personnel can be difficult to see by vehicular traffic.	Wear Class II traffic vest if wells are located proximal to vehicular traffic. Use tall cones and the buddy system if practicable.	
		2 pinchpoints on well vault can pinch or lacerate fingers	Use correct tools to open well vault/cap. Wear leather gloves when removing well vault lids, and chemical protective gloves while gauging. Wear proper PPE including safety boots, knee pads and safety glasses.	
		3 Lifting sampling equipment can cause muscle strain	Unload as close to work area as safely possible; use proper lifting and reaching techniques and body positioning; don't carry more than you can handle, and get help moving heavy or awkward objects.	
		4 Pressure can build up inside well causing cap to release under pressure	Keep head away from well cap when removing. If pressure relief valves are on well use prior to opening well	
3	Begin Purging Well and Collecting Parameter Measurements	1 Electrical shock can occur when connecting/disconnecting pump from the battery.	Make sure equipment is turned off when connecting/disconnecting. Wear leather gloves. Use GFCIs when using powered tools and pumps. Do not use in the rain or run electrical cords through wet areas.	

3	Begin Purging Well and Collecting Parameter Measurements	2	purge water can spill or leak from equipment	Stop purging activities immediately, stop leakage and block any drainage grate with sorbent pads. Call PM to notify them of any reportable spill.	
		3	Water spilling on the ground can cause muddy/slippery conditions	Be careful walking in work area when using plastic around well to protect from spillage	
		4	lacerations can occur when cutting materials such as plastic tubing	When cutting tubing, use tubing cutter. No open fixed blades should ever be used. When possible wear work gloves, leather type.	
		5	purge water can splash into eyes	Pour water slowly into buckets/drums to minimize splashing. Wear safety glasses	
4	Collect GW or Free Product Sample	1	Working with bailer rope can cause rope burns on hands.	Slowly raise and lower the rope or string for the bailer. Wear appropriate gloves for the task.	
		2	sample containers could break or leak preservative	Discard any broken sampleware or glass properly. Do not overtighten sample containers. Wear chemical protective gloves	
5	Recovery of Free Product from well	1	exposure to free product	Additional chemical protection may be necessary based on the type of product. Additionally, safety goggles, a faceshield, or respiratory protection may be required. Verify in the HASP.	
6	Staging of Well Purge water and/or Free Product	1	Muscle strains can occur when moving purge water or drums	If using buckets, do not fill buckets up to the top. Always keep lid on buckets when traveling or moving them to another location. Only half fill buckets so when dumping the buckets weigh less. See drum handling JLA for movement of drums.	Drum handling JLA

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)		Required
Hand Protection	work gloves (specify type)	leather	Required
Head Protection	hard hat		Required

Supplies

Type	Supply	Description	Required
Communication Devices	mobile phone		Required
Decontamination	Decon supplies (specify type)		Required
Miscellaneous	fire extinguisher		Required
Miscellaneous	first aid kit		Required
Personal	eye wash (specify type)	bottle	Required
Traffic Control	traffic cones		Required

Job Loss Analysis

General

Client Name	ORANGE & ROCKLAND UTILITIES, INC.
JSA ID	1878
Job Name	Environmental-Sample cooler handling
Task Description	Sample Cooler Handling
Project Number	B00430210000
Project Name	PORT JERVIS FORMER MGP SITE
PIC Name	CARRILLO-SHERIDAN, MARGARET
Project Manager	CORBIN, ANDREW
Status Name	(3) Completed
Creation Date	3/16/2010 2:23:43 PM

User Roles

Role	Employee	Due Date	Completed	Approve	Supervisor	Active Employee
Created By	Benoit, Michael	4/6/2010	3/16/2010		Corbin, Andrew	True

Job Steps

Job Step	Job Step Description	Potential Hazard	Critical Action	HSP 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)	Only use coolers that are new or in like new condition, No rope handled coolers unless part of the manufacturer's handle design.	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.	ARCADIS Shipping Guide US-001
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.	
		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 gravel rough 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 Hama 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 carrer or lab couriou 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.	

Personal Protective Equipment

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

Supplies

Type	Supply	Description	Required
Miscellaneous	Other	Scissors	Required

Job Loss Analysis

General

Client Name	ORANGE & ROCKLAND UTILITIES, INC.
JSA ID	1880
Job Name	Environmental-Boating/water work
Task Description	Boating/Water Work
Project Number	B00430210000
Project Name	PORT JERVIS FORMER MGP SITE
PIC Name	CARRILLO-SHERIDAN, MARGARET
Project Manager	CORBIN, ANDREW
Status Name	(3) Completed
Creation Date	3/16/2010 2:29:27 PM

User Roles

Role	Employee	Due Date	Completed	Approve	Supervisor	Active Employee
Created By	Benoit, Michael	4/6/2010	3/16/2010		Corbin, Andrew	True

Job Steps

Job Step	Job Step Description	Potential Hazard	Critical Action	HSP Reference
1	Placement of boat	1 Slip/trip/falls can occur when accessing or egressing boat	Wear anti-slip footwear with ankle support. Plan route onto and off of boat, do not hurry through task.	Field H&S Handbook V(G)
		2 Clutter and equipment on boat can cause tripping hazard including location and placement of equipment cables, ropes, or chains.	Maintain good housekeeping and aisle space. Secure objects to prevent shifting or movement that could impair walkway. Keep materials clear of designated walkways, cover if practical.	Field H&S Handbook V(G)
		3 Boat can be damaged from encountering objects and other protuberances in water during boat operation	Use qualified boat operator, and use spotters if navigating in areas with shallow depths, felled trees in water or rock hazards, use depth finders as appropriate	Field H&S Handbook V(G)
		4 Muscle strains from moving equipment onto or off of boat	Use proper techniques by keeping back straight, use buddy system for large or bulky items, avoid awkward twisting or stooping.	Field H&S Handbook V(G)
2	Operating the boat	1 Capsize	Keep loads evenly distributed in the boat at all times. Operate power boates at safe speed using employees trained in powervboats operation and safety.	Field H&S Handbook III(X)
		2 Falls overboard	Avoid leaning over the edge of the boat when collecting samples or retrieving equipment. wear PFD at all times. Do not work alone on boats	Field H&S Handbook III(X)
		3 Slips trips and falls on the boat while in motion	Remain seated while the boat is in motion, if movement is required use handrails, hand holds and other supporting devices to maintain stability while walking. Wear shoes with antislip soles. Always maintain good housekeeping.	Field H&S Handbook III(X)
		4 Puncture of inflatable watercraft	Avoid using inflatable watercraft with equipment generating heat or having sharp edges. Avoid sampling from inflatable watercraft with sample bottles containg preservatives that might affect the integrity of the boat material.	Field H&S Handbook III(X)
3	Extracting boat from water	1 Damage to boat approaching ramp or shore	Plan route to ramp or shore and use lookouts to spot objects in water that may damage boat.	Field H&S Handbook III(X)
		2 Falls from boat accesssing dock, ramp or shore.	Do not hurry through task, plan route and use TRACK. Step , not jump, off boats. Wear shoes with antislip soles.	Field H&S Handbook III(X)
		3 Muscle strain guiding boat onto trailer or manually removing small boats from water and loading on vehicles.	Use TRACK, do not hurry through task, use proper lifting techniques. Do not overexert pushing or pulling the boat,. Maintain good footing especially on slopes and ramps. Use buddy system to place small boats on top of vehicles.	Field H&S Handbook III(X)
		4 Cuts, scrapes to hands and head when securing boats, especially smaller boats to vehicles.	Maintian good visibility of work area, use good communication with buddy helping secure the boat, wear protective gloves. Do not throw straps over the boat to secure to opposite side. Do not hurry through task.	Field H&S Handbook III(X)

Personal Protective Equipment

Type	Personal Protective Equipment	Description	Required
Eye Protection	safety glasses		Required
Foot Protection	boots		Required
Hand Protection	work gloves (specify type)	leather	Required
Miscellaneous PPE	personal flotation device		Required

Supplies

Type	Supply	Description	Required
Communication Devices	walkie talkie		Required
Miscellaneous	fire extinguisher		Required
Miscellaneous	first aid kit		Required

Job Loss Analysis

General

Client Name	ORANGE & ROCKLAND UTILITIES, INC.
JSA ID	1881
Job Name	General Industry-Driving - passenger vehicles
Task Description	Driving (Passenger Vehicles)
Project Number	B00430210000
Project Name	PORT JERVIS FORMER MGP SITE
PIC Name	CARRILLO-SHERIDAN, MARGARET
Project Manager	CORBIN, ANDREW
Status Name	(3) Completed
Creation Date	3/16/2010 2:31:31 PM

User Roles

Role	Employee	Due Date	Completed	Approve	Supervisor	Active Employee
Created By	Benoit, Michael	4/6/2010	3/16/2010		Corbin, Andrew	True

Job Steps

Job Step	Job Step Description	Potential Hazard	Critical Action	HSP Reference
1	Performing Pre-trip inspections	1 Cuts scrapes to hands and fingers checking engine fluids	Use TRACK to plan inspection activity in the engine compartment. Wear protective gloves if reaching in poorly illuminated areas of the engine.	
		2 Pinch crush hazards to hands and fingers checking engine fluids or closing doors.	Identify and keep hands fingers away from pinch hazards from doors and vehicle hood or tailgate (if present).	
		3 Awkward body positions checking tires, spare tire, undercarriage, or engine compartment.	Maintain neutral body positions and avoid awkward reaches under the vehicle or in engine compartment.	
		4 Failure to inspect vehicle emergency equipment may result in extensive vehicle damage or delay treatment in the event of injury	Conduct equipment inspections by visibly inspecting fire extinguisher and first aid kit for cleanliness, in date items/tags, readiness for use.	
2	Vehicle loading and unloading	1 Object placement obstructing rear, side or blindspot view	Avoid placing objects in manner that does not obstruct view, brake equipment down to smaller more manageable size to keep low profile in vehicle. If hanging clothes in vehicle place in manner that does not obstruct blind spots	
		2 Unsecure objects causing pedal, steering or gear shift obstruction or injury during vehicle operation.	Secure all loads in vehicle (both in the bed of trucks and in passenger cabin) to prevent unanticipated movement or shifting that could injure driver, passenger, or affect safe operation of vehicle.	
		3 Obstruction of vehicle safety equipment caused by object placement in vehicle.	Keep emergency equipment clear and unobstructed to ensure ready availability.	

3	Vehicle operation	1	Failure to use Smith System "5-Keys" increases risk of accident and injury.	Use Smith System "5-Keys", maintain space cushion around vehicle, maintain 4 second rule and add (second for each additional hazard (wet roads, snow, etc). Brake gradual, keep eyes moving, check mirrors every 6-8 seconds, use turn signals, focus on relevant objects, use early lane positioning when approaching turns.	
		2	Injury or death from failure to wear seatbelt	Always wear seatbelts even if driving short distances off of a public roadway.	
		3	Cell phone use increases risk of accident and injury	Avoid using cell phones in any capacity when operating a vehicle, check client for cell use on project sites and follow requirements. Follow all local laws.	
		4	Use of radar detectors encourages speeding resulting in increased risk for accident or injury	Use of radar detectors and similar devices is prohibited.	
4	Routine maintenance	1	Pinch crush hazards to hands and fingers replacing engine fluids or closing doors/hood.	Inspect and identify pinch and crush hazards and keep hands/fingers clear when closing hood, tailgates, or doors.	
		2	Burn hazards to hand from checking/replacing fluids in engine compartment	When practical allow engine to cool prior to servicing or adding fluids. Use protective gloves.	
		3	Vehicle damage from improper fuse replacement	Never replace a fuse with a higher amperage than the one being replaced. Only replace fuses of type being replaced.	
		4	Failing to use Wright Express for vehicles equipped with fuel card impairs maintenance tracking that could affect vehicle safety	If vehicle is assigned a Wright Express Card, use the card so accurate maintenance tracking can be performed by LeasePlan.	

Supplies

Type	Supply	Description	Required
Communication Devices	mobile phone		Required
Miscellaneous	fire extinguisher		Required
Miscellaneous	first aid kit		Required
Traffic Control	Other	Roadway emergency kit	Required

Job Loss Analysis

General

Client Name	ORANGE & ROCKLAND UTILITIES, INC.
JSA ID	1882
Job Name	General Industry-Roadway work
Task Description	Roadway Work
Project Number	B00430210000
Project Name	PORT JERVIS FORMER MGP SITE
PIC Name	CARRILLO-SHERIDAN, MARGARET
Project Manager	CORBIN, ANDREW
Status Name	(3) Completed
Creation Date	3/16/2010 2:33:20 PM

User Roles

Role	Employee	Due Date	Completed	Approve	Supervisor	Active Employee
Created By	Benoit, Michael	4/6/2010	3/16/2010		Corbin, Andrew	True

Job Steps

Job Step	Job Step Description	Potential Hazard	Critical Action	HSP Reference
1	Deployment and removal of traffic control devices	1 Lifting hazards and awkward body positions from moving warning signs and control devices	Avoid excessive force pushing or pulling devices from vehicle; use the buddy system for heavier items; lift with legs and not back; avoid lifting and twisting motions.	ARCADIS H&S Handbook section III LL
		2 Struck by vehicle during placement	Wear high visibility clothing and Class II (minimum) traffic vest. Choose lime green color to avoid motorist confusion with traffic barrels. Always face oncoming traffic, use spotter if performing work that keeps focus off traffic. Ensure vehicle equipped with light bars and/or other warning devices and ensure they are activated, including vehicle flashers.	ARCADIS H&S Handbook section III LL
		3 Increased risk of injury (ergonomic from reacted moving or impact from increased vehicle exposure) from poor traffic control planning and implementation	Develop traffic control plan consistent with Manual of Uniform Traffic Control Devices, ensure lane closure tapers are computed properly, place devices in a manner that offers protection as other devices are deployed, place early warning devices first to warn drivers of pending work zone.	ARCADIS H&S Handbook section III LL
2	Flagger activities	1 Struck by vehicle while performing activity	Always face oncoming traffic, wear high visibility clothing described in step 1 above. Flaggers to be properly trained in proper flagging technique, if using paddles, ensure correct paddle warning displayed.	Certain states require flagger training: www.flagger.com
		2 Fatigue from standing in one position for extended periods of time.	Use job rotation when practical, shift weight from one leg to the other periodically, wear comfortable boots.	Certain states require flagger training: www.flagger.com

2	Flagger activities	3	Dehydration, heat stress (summer months), cold stress (winter months), sunburn, windburn	Ensure drinking water is in immediate vicinity of the flagger, check with flagger periodically to evaluate signs of heat or cold stress, avoid caffeine or sugary drinks during hot or cold weather, schedule work for worker to eat at regular intervals, wear sun block	Certain states require flagger training: www.flagger.com
		4	Struck by debris off roadway from passing vehicles	Be aware of hazard and be vigilant for debris, wear eye protection at all times.	Certain states require flagger training: www.flagger.com
3	Working in work zone	1	Struck by vehicle while performing work	Always stay behind protective barriers or channeling devices, never park vehicle that exposes workers to on coming traffic outside of barriers and channeling devices. Wear clothing and PPE described in step one above. Park vehicles within work zone to act as barriers to oncoming traffic when possible.	
		2	Struck by equipment in work area	Establish eye contact with all equipment operators when entering equipment operating radius, wear high visibility clothing and PPE as described in step one above. Park project vehicle away from active work area but still in work zone barriers or channeling devices.	
		3	Slips, trips and falls on wet or uneven surfaces in road right of way.	Wear proper footwear with good tread and ankle support. Plan route when walking on sloped surfaces, when walking along roadway stay as far off roadway as possible to avoid falling into traffic if tripping.	

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
Miscellaneous PPE	traffic vest--Class II or III		Required

Supplies

Type	Supply	Description	Required
Communication Devices	mobile phone		Required
Communication Devices	walkie talkie	if using flaggers	Required
Miscellaneous	fire extinguisher		Required
Miscellaneous	first aid kit		Required
Traffic Control	traffic cones		Required

Job Loss Analysis

General

Client Name	ORANGE & ROCKLAND UTILITIES, INC.
JSA ID	1883
Job Name	General Industry-Site inspection/walkover - building
Task Description	Site Inspection/Walkover - Building
Project Number	B00430210000
Project Name	PORT JERVIS FORMER MGP SITE
PIC Name	CARRILLO-SHERIDAN, MARGARET
Project Manager	CORBIN, ANDREW
Status Name	(3) Completed
Creation Date	3/16/2010 2:35:00 PM

User Roles

Role	Employee	Due Date	Completed	Approve	Supervisor	Active Employee
Created By	Benoit, Michael	4/6/2010	3/16/2010		Corbin, Andrew	True

Job Steps

Job Step	Job Step Description	Potential Hazard	Critical Action	HSP Reference
1	Evaluate site upon arrival for personal safety and security	1 Building could have structural issues creating fall hazards, or debris could cause slip/trip/fall hazards.	Assess building, and make sure that hazards were similar as what was scoped in the project or reported by the client. Additional hazards that could impact safety of personnel should be called into the project manager. An engineer should perform an assessment on any building that appears structurally unsafe.	
		2 personal security	Assess potential personal security issues prior to starting work. Verify cell phone reception. In high risk areas, have a security escort as needed. Notify PM/TM or supervisor of time of entry and anticipated time of exit. Inform that person of anticipated walking route.	
2	Building inspection	1 Limited lighting and visibility could cause slip/trip/falls over hard to see hazards on the ground	All personnel will carry their own flashlight. Carry extra batteries.	
		2 unstable or slippery (oil and ice covered) walking and work surfaces	Use caution and proper footwear with traction for potential slippery surfaces. Walk around these areas when possible.	
		3 Inadequate barricades and guards around pits or depressions could cause fall or trip hazard.	Use the flashlight to clear the area prior to entry, walk slowly and do not walkthrough puddles as it may be a larger depression filled with water/oil.	
		4 PCB containing oil, residual chemicals could be encountered	Avoid all dermal contact with equipment/chemicals/etc located within the building. Wear nitrile gloves when touching or picking up objects left in the building.	
		5 Potential asbestos containing material could be encountered, especially in buildings constructed prior to 1987.	Avoid disturbing material that could potentially contain asbestos. This includes pipe and boiler insulation, transite board, ceiling tiles, and floor tiles. If damaged material is observed, avoid the area and disturbing the material.	
		6 Limited access and egress to the building	Confirm that everyone entering the building is aware of the exit route and periodically discuss where the point of exit is in relation to current location as you move throughout the building.	
		7 Stray animals, mice, rats	Make lots of noise while traveling through the building and carry repellent spray in the event of encountering stray animals. If a dangerous or aggravated animal is spotted, leave the building immediately and contact animal control.	
3	Roof inspections, or elevated heights inspections	1 Personal injury could occur from elevated falls	Follow the JLA for Elevated Heights	

Personal Protective Equipment

Type	Personal Protective Equipment	Description	Required
Eye Protection	safety glasses		Required
Foot Protection	boots		Required
Head Protection	hard hat		Required

Supplies

Type	Supply	Description	Required
Communication Devices	mobile phone		Required
Miscellaneous	fall protection (specify type)		Required
Miscellaneous	Other	flashlight	Required

Job Loss Analysis

General

Client Name	ORANGE & ROCKLAND UTILITIES, INC.
JSA ID	1884
Job Name	General Industry-Surveying - land
Task Description	Surveying (Land)
Project Number	B00430210000
Project Name	PORT JERVIS FORMER MGP SITE
PIC Name	CARRILLO-SHERIDAN, MARGARET
Project Manager	CORBIN, ANDREW
Status Name	(3) Completed
Creation Date	3/16/2010 2:36:49 PM

User Roles

Role	Employee	Due Date	Completed	Approve	Supervisor	Active Employee
Created By	Benoit, Michael	4/6/2010	3/16/2010		Corbin, Andrew	True

Job Steps

Job Step	Job Step Description	Potential Hazard	Critical Action	HSP Reference
1	Site reconnaissance and walk-around	1 Slips/trips/falls can occur from walking on uneven ground surface.	Survey the site upon arrival. Note any site conditions that may pose a potential hazard.	JLA-Roadway Work ARCHSFS017
		2 Site workers or equipment can be struck by site vehicular traffic	Wear Class II traffic vest and cone off the work area. Follow the JLA and Field H&S Handbook for roadway work.	JLA-Roadway Work ARCHSFS017
2	Deployment and retrieval of traffic control devices during roadway work	1 Stuck by vehicles	Face traffic and use spotter if not facing traffic, stay off the travelled roadway to extent practical, wear Class II (minimum) traffic vest. Familiarize yourself with work zone control layout prior to deploying devices.	
		2 Slips trips and falls on uneven road or land surfaces	Do not carry objects that obscure visibility of ground surface when walking, wear footgear with ankle support and good tread, use buddy system when carrying large bulky objects.	
		3 Lifting heavy or bulky signage or traffic channeling device	Brake down load to manageable size. Do not over reach to grab cones from the interior of the project vehicle. Use proper lifting techniques, maintain good vehicle housekeeping to easily retrieve control devices. Use buddy system to move heavy objects like barrels.	
		4 Pinch points to hands on folding components of sign stands	Wear leather gloves or other suitable glove. Watch for hazard and avoid placing hands in pinch areas. Do not hurry through setup/take down task.	

3	Sharpen machete, brush axe or other cutting tool	1	Sharpening machete can cause lacerations and can generate metal shavings that can cause eye abrasions.	Secure blade to a sturdy fixture such as work bench and use vice. Make sure that sharp edge does not come in contact with fingers/body when sharpening. Sharpen blade 4"-10" above handle. Tip is not sharpened. Use Kevlar gloves and safety glasses.	
		2	Cuts from unsheathed/uncovered cutting tool upon completion of sharpening activity	Promptly sheath or cover cutting blade of cutting tool upon completion of sharpening task, do not "stick" machetes in ground until needed for use.	
4	Line cutting with machete	1	Improper use of the machete can cause lacerations	Do not reach or over-extend when cutting, and cut away from the body at 45 degree angle. Always keep machete sharpened. Do not use tool if the handle becomes wet/slippery. Never stick the blade into the ground--sheath machete when not in use. See the Field H&S Handbook for detailed machete use instructions (section DD).	Field H&S Handbook Section DD
		2	Utility lines can be accidentally severed during cutting	Inspect area for location of overhead lines prior to starting the task. Do not use machete when cutting vegetation that is close to utility lines. Use more appropriate tools such as garden clippers or shears.	Field H&S Handbook Section DD
		3	Biologicals such as poisonous plants, bees/wasps, and other insects can be encountered during cutting of vegetation or brush.	Attempt to identify biological concerns prior to starting task. Use identification techniques outlined in the Field H&S Handbook.	Field H&S Handbook Section DD
		4	Cardio and muscle fatigue can be experience from prolonged use of machete or when using machete for cutting of thick vegetation.	Take proper rest breaks, and rotate work jobs with co-workers. For thick vegetation, make sure the machete is the best tool for the job.	Field H&S Handbook Section DD
		5	Impalement hazards from falls onto stumps of cut vegetation	Be aware of hazard and avoid walking in cut areas where vegetation exists that could present an impalement hazard. In areas where longer term work areas are cleared, take time to cut vegetation closer to ground surface without an angular cut.	Field H&S Handbook Section DD
		6	Objects can fall once cut, or particles can become airborne getting into eyes or puncturing skin.	Wear hard hat, safety glasses and steel-toe shoes. Determine a safe fall zone. Do not use hard strokes when cutting with the machete to limit flying particles.	Field H&S Handbook Section DD
		7	Fallen branches and vegetation can cause tripping hazard	Remove freshly cut limbs and brush from the work area to ensure balance, reduce slips and falls, and reduce obstructions.	Field H&S Handbook Section DD
5	Line cutting using brush axe or chainsaw (must be approved by Party Chief).	1	Improper use of the bush axe or chainsaw can cause serious injury	Inspect equipment before use, and keep chain sharp. Hold the chainsaw with both hands, never cut above shoulder height. Keep saw close to your body. Carry brush axes sheathed and blade facing away from body. Do not carry brush axes when carrying other large or bulky objects.	Site clearing JLA
		2	Struck by brush axe	Maintain proper separation distance when cutting, ensure anti-slip tape or other material on handles of brush axe to prevent slipping out of hands , wear gloves with good gripping capability.	Site clearing JLA

5	Line cutting using brush axe or chainsaw (must be approved by Party Chief).	3	Utility lines can be accidentally severed during cutting	Inspect area for location of overhead lines prior to starting the task. Note direction of fall for trees and ensure contact with utility lines will not occur	Site clearing JLA
		4	Objects can fall once cut, or particles can become airborne getting into eyes or puncturing skin.	Wear hard hat, safety glasses and steel-toe shoes. Determine a safe fall zone. to limit flying particles.	Site clearing JLA
		5	Fallen branches and vegetation can cause tripping hazard	Remove freshly cut limbs and brush from the work area to ensure balance, reduce slips and falls, and reduce obstructions.	Site clearing JLA
		6	Noise hazards (chainsaw)	Wear hearing protection (ear plugs or ear muffs)	Site clearing JLA
6	Removal of manhole covers	1	Pinch points and scrape hazards when removing MH cover.	Do not place fingers under lid during removal, use shovels, pry bars, etc to place under lid edge to lift. Wear sturdy work glove. Wear steel toe boot, do not purposely drop lids.	
		2	Back/neck/arm/shoulder strains and hand blisters could occur from over lifting, or not lifting properly.	Use proper lifting techniques, keep back straight, lift with legs, use "J" Hook or pry bar, Buddy System required	
7	Equipment set-up, calibration and survey of target area	1	Slips/trips/falls can occur from walking on uneven ground surface.	Watch for uneven ground, debris, and trip hazards. If possible clear area of trip hazards. Wear gloves and heavy denim work pants to avoid cuts when working in heavy brush/briers. Use buddy system to spot for uneven ground while surveying.	
8	Placement of stakes	1	Hands/fingers/arms can get struck by hammer/mallet. Splinters and lacerations can occur if stake splints during hammering.	Wear leather work gloves and safety glasses when placing stakes.	
9	Placement of monuments	1	Back strain from digging holes or mixing concrete	Use proper shoveling techniques and keep back straight, Use right tool for the job.	refer to Concrete work JLA
		2	Exposure to concrete can cause skin irritation or illness	Wear impermeable glove during mixing and concrete placement, promptly wash exposed skin. Do not use bare hands to mix, place, or finish concrete.	refer to Concrete work JLA
		3	Inhalation of concrete dust during mixing	Keep face away from concrete when poured out of bag, Promptly wet concrete to be mixed.	refer to Concrete work JLA

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)	Kevlar for machete use, leather for cutting	Required
Head Protection	hard hat		Required
Miscellaneous PPE	other	chainsaw chaps	Required

Supplies

Type	Supply	Description	Required
Miscellaneous	fire extinguisher		Required
Miscellaneous	first aid kit		Required
Miscellaneous	Other	snake chaps depending on work location	Recommended
Personal	water/fluid replacement		Required
Traffic Control	traffic cones	for roadway surveying	Required

ARCADIS

Procedures

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1. Policy

ARCADIS understands the hazards of personal exposure to benzene. Based on this understanding, ARCADIS will implement the appropriate controls to minimize or eliminate the hazards of benzene. These controls will focus first on engineering controls to mitigate benzene hazards where appropriate and practical. Administrative controls may also be implemented as appropriate and practical. Where it is not appropriate or practical to implement engineering and administrative controls, personal protective equipment (PPE) will be implemented to control benzene hazards below known occupational exposure limits.

2. Purpose and Scope

2.1 Purpose

2.1.1 Benzene Exposure Protection - This policy and associated procedures provides information to protect ARCADIS employees, subcontractors, and other effected personnel from exposures to benzene while conducting work on ARCADIS projects.

2.1.2 OSHA Requirements – This policy meets the requirements of the U.S. Occupational Safety and Health Administration (OSHA) regulations including Title 29 Code of Federal Regulations (CFR) Part 1910.1028.

2.2 Scope

This policy and the associated procedures apply to all projects where benzene is known or thought to be present, and where ARCADIS employees, subcontractors and other effected personnel are or could be exposed to benzene above the Action Level.

3. Definitions

Benzene—is a colorless liquid with a sweet odor. It evaporates into the air very quickly and dissolves slightly in water. It is highly flammable and is formed from both natural processes and human activities. Some industries use benzene to make other chemicals which are used to make plastics, resins, and nylon and synthetic fibers. Benzene is also used to make some types of rubbers, lubricants, dyes, detergents, drugs, and pesticides. Benzene is also a natural part of crude oil, gasoline, and cigarette smoke.


Benzene is encountered on ARCADIS projects, frequently, as a contaminant in soils, ground and surface water, sediments, and other environmental media. Personnel may also encounter benzene in other forms at certain client facilities at which ARCADIS works. It can be encountered at petroleum-related facilities, chemical production facilities and other types of industrial sites.

Action Level—the airborne concentration established by OSHA that triggers certain regulatory requirements.

HSP—Health and Safety Procedure

Permissible Exposure Limit (PEL)—an average airborne concentration regulatory limit established by OSHA above which requires control to protect people from adverse health effects.

Short Term Exposure Limit (STEL)—a PEL or TLV established as a limit of exposure measured over a designated period of time less than 8 hours.

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Threshold Limit Value (TLV)—a recommended average airborne concentration limit established by ACGIH. The TLVs are reviewed and updated as appropriate annually.

Time Weighted Average (TWA)—a measurement of airborne exposure to a chemical compound measured and averaged over a designated period of time for comparison to an STEL or an 8-hour PEL or TLV.

4. Responsibilities

4.1 Principal-In-Charge, Project and Task Managers are responsible, as part of the project hazard assessment, for determining if benzene is or is potentially present on a project site. In addition, the project or task manager is responsible for determining client requirements with respect to the control of benzene hazards. Project and Task Managers notify health and safety staff when working on sites containing benzene. Project and Task Managers are also responsible for ensuring that project staff has the appropriate and applicable training for benzene prior to those staff beginning work.

4.2 Corporate Health and Safety is responsible for keeping this policy and procedure up-to-date with current regulatory requirements and best practices. In addition, Corporate Health and Safety oversees the medical surveillance program for benzene, as applicable and provides a benzene training package for presentation to appropriate staff.


4.3 Project Health and Safety Staff including designated Writers and Reviewers of Project Health and Safety Plans (HASPs) are responsible for developing control processes and techniques on specific projects based on the levels of benzene expected to be encountered on project facilities.

4.4 Project Personnel are responsible for completing benzene training as required by this policy and procedure, and for following all hazard control processes designated by the Project Manager, Project Health and Safety Staff, and the project HASP. If project personnel believe that benzene is present that was not previously identified or is at levels that are higher than expected, they should stop work and notify project health and safety staff or the project manager immediately and not proceed until authorized.

5. Procedure

5.1 Benzene Hazards

- Benzene is primarily an inhalation hazard. Benzene vapor does not present an appreciable skin hazard; benzene liquid is absorbed through the skin.
- The acute (short term) effects of inhalation exposure are similar to most other hydrocarbons (narcosis, dizziness, weakness, headache, nausea).
- Prolonged or repeated exposure to concentrations above the permissible exposure limits may lead to blood disorders, including anemia, leucopenia (low white blood cell counts), and leukemia (cancer of the blood system).

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- As with most hydrocarbons, repeated/prolonged skin exposure to liquid may lead to the aforementioned disease(s) of the blood.


5.2 Exposure Limits and Regulated Areas

The following personal exposure limits are established for benzene by inhalation:

- OSHA ACTION LEVEL – 0.5 ppm benzene in air 8-hour TWA.
- OSHA PELs
 - TWA - 1.0 part per million (ppm) benzene in air averaged over an 8 hour period.
 - STEL - 5.0 ppm benzene in air averaged over any 15 minute period.
- ACGIH TLVs
 - TWA – 0.5 ppm benzene in air averaged over an 8 hour period
 - STEL – 2.5 ppm benzene in air averaged over an 8 hour period
 - Skin notation – meaning that there is a significant contribution to overall exposure by the cutaneous route including mucous membranes and the eyes, and by contact with vapors, liquids and solids containing benzene.
- Personal exposure is the concentration of benzene to which a person would be exposed if that person were not wearing respiratory protection. Personal exposures shall be measured over the exposure period in the breathing zone of the employee. Personal exposures should not be determined by area sampling.
- REGULATED AREA
 - An area where the benzene exposure does or can be expected to exceed the PELs or TLVs. Since it may be difficult to determine the exposure time for employees working in areas with concentrations that exceed PEL or TLV values, the facility/location may wish to regulate any area that exceeds 0.5 ppm or per the requirements of the client or of the project HASP.
 - The PEL for benzene is relatively low as compared to the PEL or TLV of other hydrocarbons such as gasoline (300 ppm); therefore, depending on exposure conditions, it may be very “easy” to exceed the PEL or TLV for benzene even though other hydrocarbon levels are not considered very high. Also of concern is historic monitoring data that indicates that short term work activities such as draining a cargo hose of gasoline or pumping free product from an aquifer may result in a benzene exposure exceeding the STEL.

5.3 Actions for Employee Exposures Greater Than or Equal to the OSHA Action Level or ACGIH TLV – TWA but Less than the OSHA PEL - TWA

- Training: Annual benzene training is required.

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- Respiratory Protection: full-face air purifying respirators equipped with organic vapor cartridges will be used per the project HASP.
- Medical Surveillance: Initial and annual medical exams (see below) are required if employee personal exposures do or can be reasonably expected to exceed the Action Level on at least 30 calendar days during the coming year.
- Periodic Monitoring - shall be conducted at least annually until at least two consecutive exposure determinations (no less than 7 days apart) indicate the exposure is below the Action Level.

5.4 Actions for Employee Exposures Greater Than PELs

- Respiratory Protection: respirators shall be used in all regulated areas.
- Training: Annual benzene training is required.
- Medical Surveillance: Initial and annual medical exams (see below) are required if employee personal exposures do or can be reasonably expected to exceed the PEL on a least 10 calendar days during the coming year.
- Written Program: A written program to reduce personal exposure is required detailing the methods to be used to reduce exposures below the TLVs and the OSHA Action Level. These written programs will be in the form of the project HASP based on project-specific and client requirements. The HASP will indicate the schedule for the implementation of the any benzene-related hazard control processes or methods. The HASP is reviewed periodically per the ARCADIS HSP ARC HSFS010 – Health and Safety Plans. All project personnel have access to the project HASP at all times.
- Periodic Monitoring - at least every 6 months until at least two consecutive exposure determinations (no less than 7 days apart) indicate the exposure is below the PEL; then annually until at least two consecutive exposure determinations (no less than 7 days apart) indicate the exposure is below the PEL Action Level.

5.5 Exposure Monitoring


- Representative personal exposure monitoring is required for each type of operation involving the handling of or potential exposure to benzene.
- Personal exposure monitoring shall utilize standard industrial hygiene sampling techniques and recordkeeping.

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- Passive badges such as the 3M 3500 or charcoal tube sampling may be used for this sampling activity.
- Detection tubes shall not be used for compliance personal exposure determination but may be used for work and confined space entry permitting and defining regulated areas.
- Employees who have been monitored for benzene exposure shall be notified of the monitoring results within 15 working days of receipt of these results. If the PEL is exceeded, the notification must indicate the follow-up plans or corrective actions to be taken to reduce exposures to below the PEL.
- Personal STEL monitoring should be used to characterize exposures for specific tasks such as gauging, O&M of treatment equipment, hose connect and disconnect, maintenance tasks such as flange breaking, etc.
- Personal TWA monitoring can be used for extended tasks, such as well developing and sampling, loading, tasks inside vessel holds, tank cleaning, and maintenance tasks such as pump removal, etc.
- Area sampling can be used to determine regulated areas; the sampling media shall determine the duration of sampling:
 - Detection tubes (Kitagawa #118SB, or Draeger 0.5/c) can be used for real-time determination.
 - Charcoal tube samples must be taken for at least 15 minutes (passive badges are not recommended for area sampling).
- Periodic Monitoring is required if exposures exceed the Action Level or PELs.

5.6 Requirements for Regulated Areas

- Posting: Regulated areas shall be indicated such as by barricades, barricade tape, painted demarcations, or other devices.

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- A sign shall be posted at the access to the regulated area with the warning:

<p>1. DANGER</p> <p>2. BENZENE</p> <p>3. CANCER HAZARD</p> <p>4. FLAMMABLE - NO SMOKING</p> <p>5. AUTHORIZED PERSONNEL ONLY</p>

[Minimum lettering height: DANGER BENZENE 4"; others 3"]


- Respiratory Protection: Respirators shall be worn by all personnel when in a regulated area, regardless of the time period or over-all personal exposure measurement.
- Labeling
 - In addition to appropriate Hazard Communication labeling, containers or equipment containing > 0.1% benzene must also be labeled as such:

<p>DANGER</p> <p>CONTAINS BENZENE</p> <p>CANCER CAUSING AGENT</p>
--

- Pipelines do not need to be labeled.

5.7 Exposure Reduction

- Written Program
 - The Project Manager and the Project Health and Safety Staff will develop a written program for exposure reduction if there is a determination that employee exposures may exceed the PELs or TLVs.
 - The written program must list the corrective actions that will be taken to reduce employee exposure to at or below the PELs and TLVs:
 - identify regulated areas/tasks;
 - engineering controls;
 - revised work practices;
 - respiratory protection and protective clothing; and
 - schedule of development and implementation.

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- Spills and Emergencies


An emergency is any occurrence which may result in an unexpected significant release of benzene that may result in a significant inhalation or skin exposure. After an emergency, appropriate monitoring must be conducted to assure the ambient benzene levels are back to normal; and conduct appropriate medical surveillance for affected employee(s).

- Respiratory Protection and Personal Protective Equipment

- Respirators shall be worn, maintained and managed in accordance with the OSHA standard, 29 CFR 1910.134 and ARCADIS HSP ARC HSGE017 – Respiratory Protection. In addition, any client requirements on project sites will be followed.
- Per the project HASP, respiratory protection will be worn at all times when airborne concentrations of benzene exceed the OSHA Action Level or the ACGIH TLV-TWA. The respirator will be a full-face air purifying respirator equipped with organic vapor cartridges. Action limits for upgrading to a higher level of protection will be documented in the project HASP or per client requirements.
- Appropriate eye protection will be worn as necessary. Protective clothing and gloves suitable for the particular product (such as for gasoline) will generally be suitable for protection against the benzene in that product. For most hydrocarbon products, nitrile gloves, provide adequate protection. Chemical resistant clothing may vary depending on the product and degree of exposure.
- For “pure” benzene the following materials are recommended:
 - gloves: poly-vinyl alcohol (PVA)
 - clothing: Saranex or Barricade (DuPont) or equivalent.

5.8 Medical Surveillance

- Initial medical surveillance is required:
 - If employee personal exposures are reasonably expected to exceed the Action Level on at least 30 calendar days per year; or
 - If employee personal exposures are reasonably expected to exceed the PEL on a least 10 calendar days per year.
- Periodic exams are required on an annual basis for employees who continue to meet the criteria listed above. Annual exams may be discontinued after the exam conducted the year after personal exposures fall below the limits stated above in this section.
- The specific medical exam requirements are explained in detail in ARCADIS HSP ARC HSGE010 - Medical Surveillance.
- The physician must be supplied a copy of the OSHA benzene regulation 29 CFR 1910.1028 and a description of the employee's benzene exposure.

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- For employees exposed to benzene from an emergency, a urine sample must be taken at the end of the shift. A urinary phenol test must be performed on the sample within 72 hours.
- OSHA regulations for benzene have specific medical removal provisions for medical examinations results falling outside of certain criteria. The facility/location should contact the Corporate Health and Safety Manager if the examining physician indicates that an employee may fall into these criteria.

5.9 Training

- Initial benzene training is required for all employees assigned to a work area suspected or known to contain benzene.
- Annual benzene training is required for all employees actually or potentially exposed to greater than the Action Level (TWA > 0.5 ppm).
- Initial and annual training shall consist of:
 - The operations that involve benzene exposure.
 - The methods/observations that can be used to detect the presence or release of benzene
 - The physical and health hazards of benzene.
 - Methods used to protect against the hazards of benzene.
 - The proper use of personal protective equipment in emergency situations.
 - The meaning of a regulated area and how such are demarcated.
 - A review of the applicable standard and where copies can be found.
 - An explanation of the medical surveillance program

6. References

- OSHA 29 CFR 1910.1128 Benzene
- ACGIH 2006 TLVs and BEIs – Threshold Limit Values for Chemical Substances and Physical Agents & Biological Exposure Indices
- ARCADIS Medical Surveillance HSP – ARC HSGE006

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7. Records

- All exposure, medical, and training records shall be kept for 30 years.
- All exposure and medical records shall be made available to appropriate regulatory agencies upon written request.
- Employees who have been monitored for benzene exposure shall be notified of the monitoring results within 15 working days of receipt of these results; a written request is not required


8. Approvals and History of Change

Approved By: Mija Coppola, Director H&S Compliance Assurance and LPS



History of Change

Revision Date	Revision Number	Reason for change
26 March 2007	01	Original document
7 June 2007	02	Change to new template
6 September 2007	03	Changing over to new template format
22 February 2008	04	Template change

	<u>ARCADIS HS Procedure Name</u> Excavation and Trenching	<u>Revision Number</u> 03
<u>Implementation Date</u> 12 May 2008	<u>ARCADIS HS Procedure No.</u> ARC HSCS005	<u>Revision Date</u> 9 January 2009
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1. POLICY

It is ARCADIS US policy to be proactive in the identification, assessment and control of health and safety hazards and associated risks. To those means, any work involving trenching and excavation that is under the control or direction of ARCADIS or an ARCADIS subcontractor will be accomplished following, at a minimum, this procedure.

It is ARCADIS' policy that ARCADIS staff will not enter excavations and trenches unless it is absolutely necessary. If there are no suitable alternatives and it becomes necessary to enter excavations or trenches, this procedure, at a minimum will be strictly followed.

It is also the policy of ARCADIS to ensure an OSHA-defined Excavation Competent Person is on-site for all excavation work under ARCADIS contractual control. The competent person will be provided by the entity on site responsible for performing the excavation work unless otherwise required by the client. Thus, if an ARCADIS subcontractor is conducting the excavation work, that subcontractor will provide the competent person. If ARCADIS is self-performing the excavation services, then ARCADIS will provide a competent person whether a specialized subcontractor or authorized employee.

2. PURPOSE AND SCOPE

2.1 Purpose

To effectively control or eliminate the hazards presented by working near or entry into excavations or trenches, this procedure sets forth the accepted practice for and establishes the requirements for workplace safety near excavations and trenches and employee and subcontractor entry into such.

2.2 Scope

This procedure along with associated checklists and the Utility Location procedure (ARC HSFS019) apply to all employees of ARCADIS-US. Only trained and authorized personnel are permitted to work near or enter excavations and trenches, perform rescue services, or act as the excavation competent person.


3. DEFINITIONS

Exhibit 1 includes relevant definitions to this procedure including that for competent person qualifications.

4. RESPONSIBILITIES

4.1 Corporate H&S with Division and Practice Experts

On an annual basis, review and update, as necessary, this procedure. In addition, review cancelled checklists periodically to ensure conformance to this procedure. Provide the excavation competent person and qualified person training and retraining, or recommend qualified training provider. Provide technical assistance regarding excavation and trench

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protocol, atmospheric testing equipment, PPE, hazard assessment and research information on unusual hazards. Audit project-specific excavation sites for compliance with this procedure.

4.2 Principal in Charge (PIC), Project Manager (PM), and Task Manager (TM)

PIC, PM and TMs are responsible to:


- Verify that all excavation and trench protocols are properly identified and addressed within the project work plan, project health & safety plan, and/or other project-related documents.
- Verify that their divisional or project team employees have received the proper training provided by Corporate Health & Safety or qualified training source prior to conducting excavation/trenching entry activities.
- Verify that any ARCADIS employee acting as the Excavation Competent person has been authorized and trained to do so as noted in Exhibit 1
- Verify that the proper entry equipment, including personal protective equipment (PPE), atmospheric testing equipment and safety equipment, is available for use by their divisional employees.
- Verify that copies of the completed checklists are available for Corporate Health and Safety review and retained with the project files

4.3 Health and Safety Plan Writers and Reviewers

Utilize this procedure as guidance to ensure the appropriate identification, assessment and control of excavation and trenching hazards for documentation in project HASPs

4.4 Entry/Work Supervisors (also see Training and Duties of Entry Supervisor)


- Work in direct coordination with and under the direction of the project excavation competent person
- Interface with the client representative to identify hazards associated with the client's excavation and trenching and/or work permit programs.
- Review existing soil sampling (if any) data or other pertinent hazard characterization information recorded by the client.
- Investigate the client's excavation/trenching protocol, to verify that any identified hazards and previous experience with earthwork at the site is properly communicated.
- Coordinate entry operations with the client's employees when both client and ARCADIS employees will be working in or near an excavation/trench.

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- Coordinate necessary rescue assistance with either the client's in-house rescue team and/or the offsite rescue assistance specified by the client. The offsite rescue assistance specified by the client must have applicable rescue experience and be within a reasonable response distance.
- Verify that the client takes the necessary precautions in notifying their employees that our employees will be installing an excavation or trench.
- Review the lockout/tagout and isolation measures implemented by the client as necessary based on proximity of utilities or other energy sources in the area of the excavation/trench
- Immediately report any unusual or unforeseen excavation or trenching hazards to Corporate Health and Safety prior to authorizing entry
- Verify that all tests and precautionary measures identified on the Daily/Periodic Inspection Checklist located in Exhibit 1 and the ARCADIS Utility Location Policy and Procedure ARC HSFS019 has been performed prior to authorizing subsurface work or entry into an excavation or trench
- Offer all entrants an opportunity to review the applicable control measures and testing results and an opportunity to request a reevaluation as necessary
- Issue, authorize, and have the Utility Clearance and Daily/Periodic Inspection forms readily available for review
- Verify that copies of the completed clearance forms and checklists are properly disseminated to Corporate Health and Safety and retained with the project files, as specified in Section 8.0 – Records.

4.5 Entrants

- Qualified Employee Entrants must have training and instruction in their duties and responsibilities regarding the following:
- Recognize the hazards which may be faced during entry, as well as the signs and symptoms of exposure to the hazard(s).
- Maintain visual contact and/or verbal communications with the attendant at all times.
- Use the PPE, air monitoring and testing equipment that has been provided or have access to the information.
- Maintain an awareness of all required hazard controls and consult with the Competent Person as necessary
- Obey evacuation orders given by the Attendant, automatic alarm activation, or when self-perceived.

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4.6 Competent Person

Meet all of the requirements specified for the Qualified Employee Entrants plus adequate training and experience for their duties and responsibilities to complete the following tasks:


- Anticipation, identification and control of excavation and trenching hazards, as well as the signs and symptoms of exposure to the hazard(s), and the Authority to implement all corrective actions including Stopping Work.
- Implement the ARCADIS Utility Clearance Policy and Procedure and complete the Daily/Periodic Excavation Inspection Checklist
- Verify adequate training and experience of all Entrants prior to entry

4.7 Attendants

- An attendant must be stationed outside the excavation and be available to monitor operations above and below ground. The attendant may have no other duties besides those listed in this section.
- All attendants must have training and instruction in their duties and responsibilities regarding excavation/trenching entry. The following are assigned duties.
- Maintain an accurate count of all entrants in the excavation
- Monitor activities both inside and outside the excavation/trench to verify the continued safety of entrants
- Maintain visual contact or verbal communication with all entrants
- Order evacuation of the excavation/trench if an uncontrolled hazard develops, either within or outside the space, or upon observing a behavioral effect of hazard exposure among entrants
- Keep unauthorized persons away from the excavation area
- Participate in non-entry rescue as appropriate
- Summon rescue and other emergency services
- Attendants must maintain current certification in basic first aid and cardiopulmonary resuscitation (CPR).

4.8 All ARCADIS Employees

Use the TRACK process described below regularly and frequently. In addition, employees read and understand all documented hazard identification and risk

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assessments conducted using the HARC process and documented in HASPs, JSAs, and other written plans that are associated with their work. ARCADIS employees will:

- Recognize the hazards of trenches and excavations
- Understand and follow the methods for working near trenches and excavations
- Notify the PIC, PM, TM or entry/work supervisor if they have not received appropriate training
- Participate in entry operations only if trained and authorized to do so
- Never enter an excavation/trench without completion of the required Utility Location Procedure, Daily/Periodic Inspection Checklist and have an authorized attendant
- Never attempt entry rescue within a excavation unless trained in entry rescue with appropriate equipment available
- If unexpected conditions arise during entry, immediately notify other entrants, evacuate the space and inform the designated Competent Person


5. PROCEDURE

5.1 General Safety Requirements for all Excavations

- All surface obstructions must be moved or supported so as to protect employees and equipment.
- Prior to excavation, all underground installations (water, electric, telephone, gas, etc.) must be located and documented in accordance with ARCADIS Utility Clearance Policy and Procedure ARC HSFS019.
- When excavating in areas near underground installations, proper precautions must be taken to determine the exact location of the installations and to adequately protect and support them. While an excavation is open, underground installations shall be protected, supported or removed as necessary to protect employees.
- Structural ramps that are used solely by employees as a means of access or egress from excavations shall be designed by a competent person.
- Structural ramps used for access or egress of equipment shall be designed by a competent person qualified in structural design, and shall be constructed in accordance with the design.
- Ladders used for access and egress from the excavation must extend at least 36" (3 feet) above the landing surface.

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- If personnel are working in a location exposed to vehicular traffic they must be provided with and be required to wear reflective safety vests. Adequate, signs, barriers or other equivalent traffic controls must be used to protect employees.
- Personnel are not permitted to be beneath elevated loads handled by equipment or be in excavations when heavy equipment is digging in or near the excavation.
- Mobile equipment located near open excavations must be adequately protected from falling or rolling into excavations by the use of barricades or warning devices.
- All excavations over 4 feet in depth must be tested for hazardous atmospheres whenever personnel are required to enter and a potential exists for the existence of hazardous contaminants or oxygen deficiency. Excavations less than 4 feet in depth must be evaluated by the competent person and at the competent person's discretion be tested for hazardous atmospheres whenever personnel are required to enter and a potential exists for the existence of hazardous contaminants or oxygen deficiency.
- Means of rescue including a lifeline and body harness must be used by personnel entering excavations with a potential for air hazards. A standby person must be stationed outside the excavation to tend the lifeline(s).
- Water must not be allowed to accumulate in open excavations where employees are working. When necessary, means such as diverting natural drainage around the excavation or actively pumping water must be used to prevent or control water accumulation.
- All structures adjacent to an open excavation must be supported, or a registered professional engineer (PE) must determine that the structure will not be affected by the excavation activities.
- Excavated materials (spoil) must be placed no closer than 2 feet from the edge of an open excavation, and otherwise retained to prevent loose material from falling into the excavation.
- Protection such as guardrails, barricades or covers must be in place to protect personnel from possible falls into open excavations, pits, wells and shafts.
- Work tasks will be designed to limit the number of personnel required to enter any excavation. All tasks that can be completed remotely from outside the excavation (such as soil sampling) will be conducted in such a manner.
- Personnel will not be allowed to enter any excavation unless adequate protective systems and procedures are utilized to prevent accidents and injury.

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- All excavations over four feet in depth shall be provided with a stairway, ladder, ramp, or other safe means of egress so as to require no more than 25 feet of lateral travel. As deemed necessary by the competent person, excavations less than 4 feet in depth will be provided with a stairway, ladder, ramp, or other safe means of egress so as to require no more than 25 feet of lateral travel.

5.2 Excavations Requiring Protective Systems


This section defines excavations that require protective systems.

- All excavations into which employees will enter, regardless of depth, where the potential for cave-in exists.
- Any excavation over 4 feet in depth into which employees will enter that is not entirely in stable rock as defined in this procedure.
- Any excavation near a structure, (e.g. foundations, piers, footers, walls, sidewalks, tanks, roadways, etc.), as required by the registered professional engineer reviewing the stability of the excavation and the structure.
- All excavations over 20 feet in depth must be designed by a registered professional engineer regardless of whether personnel will enter it or not.
- All excavations with adjacent structures which are located a distance less than 6 times the depth of the excavation away shall be reviewed by a registered professional engineer to determine if the stability of the structure will be affected by the excavation.
- Support systems for an adjacent structure must be designed by a registered professional engineer.

5.3 Selection and Use of Protective Systems

5.3.1 Shoring or Shielding

- If shoring or shielding is selected as the protective system for an excavation, soil classification in accordance with 1926 Subpart P Appendix A (see Section 9 of this procedure) is required.
- One of the following options must be utilized for all excavations which will be shored or shielded.
 - Timber shoring as specified in 1926 Subpart P Appendix C must be utilized
 - Hydraulic shoring, trench jacks, air shores, or shields as required in 1926.652 (c)(2) must be utilized following the system manufacturer's data

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- A system which follows other tabulated data (approved by a registered professional engineer) must be utilized
- The excavation must be designed by a registered professional engineer

5.3.2 Sloping


- If sloping is selected as the protective system for an excavation, the excavation sides must be sloped at a maximum of 34 degrees (1.5 Horizontal: 1 Vertical), unless the procedure listed above is followed.
- Soil classification in accordance with Section 10 of this procedure) is required for all excavations with sides which will be sloped greater than 34° (1.5 Horizontal: 1 Vertical). If it will be sloped greater than 34°, the one of the following options must be utilized:
 - Option 1 - assume Type C and slope 1.5/1 - probably the most common and preferred method for us
 - Option 2 - classify soil according to the standard and use Type A/B sloping requirements
 - Option 3 – use other tabulated data with PE approval
 - Option 4 – PE approval of sloping/benching design

5.4 Atmospheric Testing for Entry

Any excavation over 4 feet in depth with a potential for hazardous contaminants or oxygen deficiency must be tested for hazardous atmospheres prior to and during activities involving entry. After atmospheric testing, if the area is found to be oxygen deficient or a hazardous atmosphere exists or could exist a confined space permit must be obtained if the area will be entered.

The site designated "competent person" will document initial and periodic air monitoring results for all activities requiring entry into the excavation. All atmospheric testing of excavations must be conducted in the following sequence and meet the following air quality criteria.

- Oxygen content must be 19.5 to 23.5%
- Combustible gas or vapor must not exceed 10% of its lower explosive limit (LEL)
- Toxic air contaminant levels must not exceed 50% of the PEL or TLV for the specific contaminant whichever is lower
- Carbon monoxide must not exceed 10 ppm for a 5 minute average or ceiling value of 25 ppm

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- Hydrogen sulfide must not exceed 0.5 ppm

5.5 Location of Underground/Overhead Utilities

- The competent person and the project manager shall both verify that local underground facilities location/protection agencies are notified within the required time frame prior to the initiation of excavation activities and meet all requirements in the ARCADIS Utility Location Policy and Procedure ARC HSFS019.
- Prior to initiation of excavation or trenching operations the competent person shall verify that all utilities have been located.

5.6 Daily/Periodic Inspections

- Prior to initiation of daily excavation or trenching operations the competent person shall complete a daily inspection of the excavation.
- During excavation or trenching operations the competent person shall complete a periodic inspection after any event (e.g., thunderstorm, vibration, excessive drying) that may affect excavation stability.
- The competent person shall complete the daily/periodic inspection checklist (A copy of the checklist is attached to this Policy as Exhibit A– Subcontractors must complete an equivalent inspection form) is completed for each inspection of excavation and trenching activities.

5.7 Soil Classification for Selection of Protective Systems

5.7.1 Soil Classification


This section describes a method of classifying soil and rock deposits based on site and environmental conditions, and on the structure and composition of the earth deposits. This section contains definitions, sets forth requirements, and describes acceptable visual and manual tests for use in classifying soils.

This section applies when a sloping, benching or shoring system is utilized as a method of protection for employees from cave-ins.

5.7.2 Soil Classification Definitions

5.7.2.1 Types/Classes of Soil

Type/Class A Soils are cohesive soils with an unconfined, compressive strength of 1.5 ton per square foot (tsf) (144kPa) or greater. Examples of cohesive soils are: Clay, silty clay, sandy clay, clay loam and in some cases, silty clay loam and sandy clay loam. Cemented soils such as caliche and hardpan are also considered Type A. However, no soil is Type A if the following apply.

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- The soil is fissured
- The soil is subject to vibration from heavy traffic, pile driving, or similar effects
- The soil has been previously disturbed
- The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical (4 Horizontal:1 Vertical) or greater
- The material is subject to other factors that would require it to be classified as a less stable material

5.7.2.1.1 Type Class B Soils

- Cohesive soils with an unconfined compressive strength greater than 0.5 tsf (48 kPa) but less than 1.5 tsf (144 kPa)
- Granular cohesionless soils including angular gravel (similar to crushed rock), silt, silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam
- Previously disturbed soils except those which would otherwise be classed as Type C soil
- Soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subject to vibration
- Dry rock that is not stable
- Material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical (4 Horizontal:1 Vertical), but only if the material would otherwise be classified as Type B

5.7.2.1.2 Type/Class C Soils

- Cohesive soil with an unconfined compressive strength of 0.5 tsf (48 kPa) or less
- Granular soils including gravel, sand, and loamy sand
- Submerged soil or soil from which water is freely seeping

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- Submerged rock that is not stable
- Material in a sloped, layered system where the layers dip into the excavation or a slope of four horizontal to one vertical (4 Horizontal:1 Vertical) or steeper


5.7.2.2 *Methods for Classifying Soils*

Each soil and rock deposit shall be classified by a competent person as Stable Rock, Type A, Type B, or Type C in accordance with the definitions set forth in this section. The classification of the deposits shall be made based on the results of at least one visual and at least one manual analysis conducted by a competent person using tests described below, or in other recognized methods of soil classification and testing such as those adopted by the American Society for Testing Materials, or the U.S. Department of Agriculture textural classification system.

The visual and manual analyses, such as those noted as being acceptable in this section, shall be designed and conducted to provide sufficient quantitative and qualitative information as may be necessary to identify properly the properties, factors, and conditions affecting the classification of the deposits. Visual analysis is conducted to determine qualitative information regarding the excavation site in general, the soil adjacent to the excavation, the soil forming the sides of the open excavation, and the soil taken as samples from excavated material.

Observe the following:

- Samples of soil that are excavated and soil in the sides of the excavation. Estimate the range of particle sizes and the relative amounts of the particle sizes. Soil that is primarily composed of fine grained material is cohesive material. Soil composed primarily of coarse grained sand or gravel is granular material.
- Soil as it is excavated. Soil that remains in clumps when excavated is cohesive. Soil that breaks up easily and does not stay in clumps is granular.
- The side of the open excavation and the surface area adjacent to the excavation. Crack like openings such as tension cracks could indicate fissured material. If chunks of soil spall off a vertical side, the soil could be fissured. Small spalls are evidence of moving ground and are indications of potentially hazardous situations.
- The area adjacent to the excavation and the excavation itself for evidence of existing utility and other underground structures, and to identify previously disturbed soil.


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- The open side of the excavation to identify layered systems. Examine layered systems to identify if the layers slope toward the excavation. Estimate the degree of slope of the layers.
- The area adjacent to the excavation and the sides of the opened excavation for evidence of surface water, water seeping from the sides of the excavation, or the location of the level of the water table.
- The area adjacent to the excavation and the area within the excavation for sources of vibration that may affect the stability of the excavation face.

Manual analysis of soil samples is conducted to determine quantitative as well as qualitative properties of soil and to provide more information in order to classify soil properly.

5.7.2.3 Classifications

- A. Plasticity. Mold a moist or wet sample of soil into a ball and attempt to roll it into threads as thin as 1/8 inch in diameter. Cohesive material can be successfully rolled into threads without crumbling. For example, if at least a two inch (50 mm) length of 1/8 inch thread can be held on one end without tearing, the soil is cohesive.
- B. Dry strength. If the soil is dry and crumbles on its own or with moderate pressure into individual grains or fine powder, it is granular (any combination of gravel, sand, or silt). If the soil is dry and falls into clumps which break up into smaller clumps, but the smaller clumps can only be broken up with difficulty, it may be clay in any combination with gravel, sand or silt. If the dry soil breaks into clumps which do not break up into small clumps and which can only be broken with difficulty, and there is no visual indication the soil is fissured, the soil may be considered unfissured.
- C. Thumb penetration. The thumb penetration test can be used to estimate the unconfined compressive strength of cohesive soils. Type A soils with an unconfined compressive strength of 1.5 tsf can be readily indented by the thumb; however, they can be penetrated by the thumb only with very great effort. Type C soils with an unconfined compressive strength of 0.5 tsf can be easily penetrated several inches by the thumb, and can be molded by light finger pressure. This test should be conducted on an undisturbed soil sample, such as a large clump of spoil, as soon as practicable after excavation to keep to a minimum the effects of exposure to drying influences. If the excavation is later exposed to wetting influences (rain, flooding), the classification of the soil must be changed accordingly.

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D. Other strength tests. Estimates of unconfined compressive strength of soils can also be obtained by use of a pocket penetrometer or by using a hand operated shear vane.

E. Drying test. The basic purpose of the drying test is to differentiate between cohesive material with fissures, unfissured cohesive material, and granular material. The procedure for the drying test involves drying a sample of soil that is approximately one inch thick (2.54 cm) and six inches (15.24 cm) in diameter until it is thoroughly dry:

1. If the sample develops cracks as it dries, significant fissures are indicated.
2. Samples that dry without cracking are to be broken by hand. If considerable force is necessary to break a sample, the soil has significant cohesive material content. The soil can be classified as an unfissured cohesive material and the unconfined compressive strength should be determined by using the thumb penetration or other test.

5.7.2.4 *If a sample breaks easily by hand, it is either a fissured cohesive material or a granular material. To distinguish between the two, pulverize the dried clumps of the sample by hand or by stepping on them. If the clumps do not pulverize easily, the material is cohesive with fissures. If they pulverize easily into very small fragments, the material is granular.*

5.7.2.5 *Layered system*

A layered system shall be classified in accordance with its weakest layer. Each layer may be classified individually where a more stable layer lies under a less stable layer.


5.7.2.6 *Reclassifying Soils*

A layered system shall be classified in accordance with its weakest layer. Each layer may be classified individually where a more stable layer lies under a less stable layer.

In most instances the ARCADIS designated Excavation/Trenching Competent person will assume Type C soil, unless they have conclusive data to validate Type A or B.

5.7.2.7 *Excavation Construction Based on Soil Type*

The Maximum allowable slope means the steepest incline of an excavation face that is acceptable for the most favorable site conditions as protection against cave-ins, and is expressed as the ratio of horizontal distance to vertical rise (H:V). Short-term exposure means a period of time less than or equal to 24 hours that an excavation is open. Soil and rock deposits must be

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classified in accordance with Appendix A to Subpart P of Part 1926. The maximum allowable slope for a soil or rock deposit must be determined from the table provided below. The actual slope must not be steeper than the maximum allowable slope. The actual slope must be less steep than the maximum allowable slope, when there are signs of distress. If that situation occurs, the slope must be cut back to an actual slope which is at least horizontal to one vertical (1/2H:1V) less steep than the maximum allowable slope. When surcharge loads from stored material or equipment, operating equipment, or traffic are present, a competent person must determine the degree to which the actual slope must be reduced below the maximum allowable slope, and must assure that such reduction is achieved. Surcharge loads from adjacent structures must be evaluated in accordance with 1926.651(l). Configurations of sloping and benching systems must be in accordance with 29 CFR 1926 Subpart P, Appendix B.

EXCAVATION SLOPE TABLE 2 29 CFR 1926 SUBPART P APPENDIX B MAXIMUM ALLOWABLE SLOPES	
Soil or Rock Type	Maximum Allowable Slopes (H:V)¹ for Excavations Less Than 20 Feet Deep²
Stable Rock	Vertical (90 degrees)
Type A ³	¾:1 (53 degrees)
Type B	1:1 (45 degrees)
Type C	1:½ (34 degrees)


- Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.
- Sloping or benching for excavations greater than 20 feet deep must be designed by a registered professional engineer.
- A short-term maximum allowable slope of 1/2H:1V (63 degrees) is allowed in excavations in Type A soil that are 12 feet (3.67 m) or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.67 m) in depth must be 3/4H:1V (53 degrees).

6. TRAINING

6.1 Project - Specific Training

All staff working on a site where trenching and excavation activities are being conducted by ARCADIS or its subcontractors will be provided with site orientation on excavation projects shall include a discussion of the following:

- Site excavation hazards and procedures
- Requirements for conducting activities remotely whenever possible
- Client requirements and procedures for excavation activities

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- This Procedure

Daily Safety Meetings on projects involving excavation activities shall include a discussion of:

- Site excavation hazards and procedures
- Requirements for conducting activities remotely whenever possible
- Client requirements and procedures for excavation activities
- This Excavation and Trenching Procedure, as appropriate


6.2 Additional Training

Besides site orientation training, additional training will be provided as follows based on the employee's activities:


- All employees who work in the area of potential excavation/trenching sites will receive awareness level training as provided and/or approved by ARCADIS Corporate H&S in order to recognize and to understand the hazards.
- Entrants, Attendants, and Entrant Supervisors will receive additional training as approved by Corporate H&S. This training will be classroom in nature and cover the details of trenching and excavation hazards and controls
- Qualified Competent Persons will be provided training as follows:

In order to be assigned duties as a competent person with respect to excavation and trenching, in addition to the criteria noted in Exhibit 1, personnel must complete an ARCADIS approved training course or an equivalent course approved by Corporate Health and Safety including but not limited to the following topics:

- Introduction to trenches and excavations
 - Definition of trenches and excavations
 - General requirements of OSHA 29 CFR 1926 Subpart P
- Responsibilities and requirements of a competent person
 - Necessary authority
 - When other/outside resources may be necessary
- Hazard Identification and Assessment
 - Cave-In Hazards including nearby structures
 - Underground utilities

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- Confined Space
- Hazardous atmospheres
- Water accumulation
- Vehicular traffic and falling loads
- Hazard controls
 - Soil analysis and testing (visual and manual)
 - Protective systems
 - Shoring
 - Sloping
 - Shielding
 - Benching
 - Personal protective equipment
 - Utility location
 - Atmospheric testing
 - Water drainage and pumping
 - Site housekeeping and management
 - Spoils
 - Traffic control
 - Overhead hazard protection
 - Communications
 - Verbal
 - Signaling
 - Access and egress
- Emergency Procedures
 - Warning signs of cave-in
 - Evacuation procedures

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- Rescue
- Inspections
 - Checklists
 - Potential deficiencies

All training provided must be reviewed and approved by Corporate Health & Safety and will be managed through ARCHIMEDES.

Documentation of training certification received by attendance at any training course including externally provided training courses will be kept by the employee with copies provided to ARCHIMEDES.

7. REFERENCES

- 7.1 ARCADIS Health and Safety Procedure ARC HSFS010– Health and Safety Planning
- 7.2 ARCADIS Health and Safety Procedure ARC HSFS004 – Control of Hazardous Energy (Lockout/Tagout)
- 7.3 ARCADIS Utility Clearance Policy and Procedure ARC HSF019
- 7.4 ARCADIS Confined Space Policy and Procedure ARC HSF003
- 7.5 OSHA 29 CFR Part 1926 Subpart P - Excavations


8. RECORDS

- 8.1 Training records will be kept by the individual employee with copies of such certificates kept by ARCHIMEDES. Training dates and times will be kept by ARCHIMEDES.
- 8.2 Completed clearance forms and checklists will be kept in the project files with copies available for Corporate H&S review.
- 8.3 Copies of all HASPs that document excavation trenching procedures will be kept in the project files.

9. APPROVALS AND HISTORY OF CHANGE

Approved By: Michael Thomas, CIH, CPEA



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History of Change

Revision Date	Revision Number	Reason for change
12 May 2008	01	Original document
13 June 2008	02	Modified Section 5.1 – 4 th bullet related to structural ramps. Modified Section 5.2 to designate a 6x factor for structural integrity of structures near the excavation. Revised Exhibit 1 to modify the definition of a Competent person
9 January 2009	03	Cleaned up definitions, deleted training requirements from Section 5.0 and moved them to Section 6.0, modified purpose statement


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Exhibit 1 – Definitions

Attendant is a trained qualified individual stationed outside the excavation whose duty is to monitor authorized entrants inside the excavation or trench and have a means of communication with the designated rescue services.


Benching/Benching system means a method of protecting employees from cave-ins by excavating the sides of an excavation to form one or a series of horizontal levels or steps, usually with vertical or near-vertical surfaces between levels.

Cave-in means the separation of a mass of soil or rock material from the side of an excavation, or the loss of soil from under a trench shield or support system, and its sudden movement into the excavation, either by falling or sliding, in sufficient quantity so that it could entrap, bury or otherwise injure and immobilize a person.

Competent person means one who, through education, training, and/or experience, is capable of identifying existing and predictable hazards or working conditions which are unsanitary, hazardous, or dangerous to employees and who has authorization to take prompt corrective measures to eliminate them. All ARCADIS employee's, must meet the following minimum requirements to be considered a Competent Person:

- Be nominated to the appropriate Division H&S Director by their supervisor or project manager to be considered as a competent person. The nomination will include the submittal of various documentation that describes why the person should be nominated and to provide evidence that they have met the criteria listed below.
- Be jointly approved by the appropriate Division H&S Director and the appropriate Practice/Client H&S Manager or resource.
- Attend ARCADIS Competent Person training or an equivalent course approved by Corporate Health and Safety
- Have a minimum of 1 year of supervised field experience and approval from their supervisor to fill the role of competent person
- If on an Environmental project where HAZWOPER training is required by ARCADIS, completed a 40 Hour HAZWOPER and HAZWOPER Supervisor training course and be current on their annual 8 Hour refresher
- Attended a 10 or 30 Hour OSHA Construction Safety Course or have equivalent training to that provided by the 10 or 30 hour course
- If a hazardous atmosphere is present, or there is limited entry or exit and the excavation or trench must be entered as a confined space, the person must also be Confined Space trained and authorized as per the ARCADIS Confined Space procedure ARC HSFS003

Excavation means any man-made cut, cavity, trench, or depression in an earth surface formed by earth removal into which a person can bodily enter. **Entry** constitutes the act by which an employee proceeds into an excavation or trench. Consideration of hazards, especially cave-ins and fall protection must still be considered and accounted for when equipment or personnel are near an excavation or trench, even if personnel will not be entering.

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Entrants are employee's who are trained and authorized to enter a trench or excavation. Entrants must have attended a Qualified Excavation Training course offered or approved by Corporate Health and Safety.

Failure means the breakage, displacement, or permanent deformation of a structural member or connection so as to reduce its structural integrity and its supportive capabilities.

Hazardous Atmosphere is an atmosphere which exposes employees to a risk of death, incapacitation, injury, or acute illness from one or more of the following:

- An atmospheric concentration of any substance in excess of 50% of its established permissible exposure limit (PEL); or its assigned threshold limit value (TLV) or other value listed on the Material Safety Data Sheet (MSDS) for the chemical constituent, whichever is lower.
- A flammable gas, vapor, or mist in excess of 10% of its lower explosive limit (LEL).
- An airborne combustible dust at a concentration that obscures vision at a distance of 5 feet or less.
- An atmospheric oxygen concentration below 19.5% (oxygen-deficient atmosphere) or above 23.5% (oxygen-enriched atmosphere).
- An atmosphere which is immediately dangerous to life and health.

Immediately Danger to Life and Health (IDLH) means any condition which poses an immediate threat to loss of life; may result in irreversible or immediate-severe health effects; may result in eye damage, irritation, or other conditions which could impair escape from the space.


Protective system means a method of protecting employees from cave-ins, from material that could fall or roll from an excavation face or into an excavation, or from the collapse of adjacent structures. Protective systems include support systems, sloping and benching systems, shield systems and other systems that provide protection.

Ramp means an inclined walking or working surface that is used to gain access to one point from another, and is constructed from earth or from structural materials such as steel or wood.

Registered Professional Engineer means a person who is registered as a professional engineer in the state where the work is to be performed. However, a professional engineer, registered in any state is deemed to be a "registered professional engineer" within the meaning of this standard when approving designs for "manufactured protective systems" or "tabulated data" to be used in interstate commerce. To oversee an excavation/trench activity the PE must have experience with and expertise in excavation, soil and stability considerations.

Sheeting means the members of a shoring system that retain the earth in position and in turn are supported by other members of the shoring system.

Shield (Shield system) means a structure that is able to withstand the forces imposed on it by a cave-in and thereby protect employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shield can be either pre-manufactured or job-built in accordance with 1926.652 (c)(3) or (c)(4). Shields used in trenches are usually referred to as "trench boxes" or "trench shields".

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Shoring (Shoring system) means a structure such as a metal hydraulic, mechanical or timber shoring system that supports the sides of an excavation and which is designed to prevent cave-ins.

Sloping (Sloping system) means a method of protecting employees from cave-ins by excavating to form sides of an excavation that are inclined away from the excavation so as to prevent cave-ins. The angle of incline required to prevent a cave-in varies with differences in such factors as the soil type, environmental conditions of exposure, and application of surcharge loads.

Stable rock means natural solid mineral material that can be excavated with vertical sides and will remain intact while exposed. Unstable rock is considered to be stable when the rock material on the side or sides of the excavation is secured against caving-in or movement by rock bolts or by another protective system that has been designed by a registered professional engineer.

Support system means a structure such as underpinning, bracing, or shoring, which provides support to an adjacent structure, underground installation, or the sides of an excavation.

Trench means a narrow excavation (in relation to its length) made below the surface of the ground to which a person can bodily enter. In general, the depth is greater than the width, but the width of a trench (measured at the bottom) is not greater than 15 feet (4.6 meters). If forms or other structures are installed or constructed in an excavation so as to reduce the dimension measured from the forms or structure to the side of the excavation to 15 feet (4.6 meters) or less (measured at the bottom of the excavation), the excavation is considered to be a trench.

Cemented soil means a soil in which the particles are held together by a chemical agent, such as calcium carbonate, such that a hand size sample cannot be crushed into powder or individual soil particles by finger pressure.

Cohesive soil means clay (fine grained soil), or soil with a high clay content, which has cohesive strength. Cohesive soil does not crumble, can be excavated with vertical sides, and is plastic when moist. Cohesive soil is hard to break up when dry, and exhibits significant cohesion when submerged. Cohesive soils include clayey silt, sandy clay, silty clay, clay and organic clay.

Dry soil means soil that does not exhibit visible signs of moisture content.


Fissured means a soil material that has a tendency to break along definite planes of fracture with little resistance, or a material that exhibits open cracks, such as tension cracks, in an exposed surface.

Granular soil means gravel, sand, or silt (coarse grained soil) with little or no clay content. Granular soil has no cohesive strength. Some moist granular soils exhibit apparent cohesion. Granular soil cannot be molded when moist and crumbles easily when dry.

Layered system means two or more distinctly different soil or rock types arranged in layers. Micaceous seams or weakened planes in rock or shale are considered layered.

Moist soil means a condition in which a soil looks and feels damp. Moist cohesive soil can easily be shaped into a ball and rolled into small diameter threads before crumbling. Moist granular soil that contains some cohesive material will exhibit signs of cohesion between particles.

Plastic means a property of a soil which allows the soil to be deformed or molded without cracking, or appreciable volume change.

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Saturated soil means a soil in which the voids are filled with water. Saturation does not require flow. Saturation, or near saturation, is necessary for the proper use of instruments such as a pocket penetrometer or shear vane.

Soil classification system means, for the purpose of this procedure, a method of categorizing soil and rock deposits in a hierarchy of Stable Rock, Type A, Type B and Type C, in decreasing order of stability. The categories are determined based on an analysis of the properties and performance characteristics of the deposits and the characteristics of the deposits and the environmental conditions of exposure.

Submerged soil means soil which is underwater or is free seeping.

Unconfined compressive strength means the load per unit area at which a soil will fail in compression. It can be determined by laboratory testing, or estimated in the field using a pocket penetrometer, by thumb penetration tests, and other methods.

Wet soil means soil that contains significantly more moisture than moist soil, but in such a range of values that cohesive material will slump or begin to flow when vibrated. Granular material that would exhibit cohesive properties when moist will lose those cohesive properties when wet.




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Exhibit 2 – Daily / Periodic Excavation Inspection Checklist

		Daily / Periodic Excavation Inspection Checklist		
Project Name:		Date / Time:		
Project Number:		Location:		
Prepared By:		Project Manager:		
This checklist must be completed for all excavations. It documents that daily and post-event / periodic inspections are conducted.				
Soil Classified As:	Stable Rock	Type A	Type B	Type C
Soil Classified On:	By:			
Type of Protective System in Use:	Sloping	Shoring	Other _____	
Description:				
Inspection Item	YES	NO	Comments	
Has the ARCADIS Utility Clearance Procedure been completed?				
Are underground installations protected from damage?				
Are adequate means of entry / exit available in the excavation – at least every 25 feet?				
If exposed to traffic, are personnel wearing reflective vests and adequate barriers/traffic controls installed?				
Do barriers exist to prevent equipment from rolling into the excavation?				
Was air monitoring conducted prior to and during excavation entry?				
Was the stability of adjacent structures reviewed by a registered P.E.?				
Are spoil piles at least 2 feet from the excavation edge?				
Is fall protection in use near excavations deeper than 6 feet?				
Are work tasks completed remotely if feasible?				
Is a protective system in place and in good repair?				
Is emergency rescue (lifeline / body harness) equipment used due to potential atmospheric hazard?				
Is excavation exposed to vibration?				
Are employees protected from falling / elevated material?				
Is soil classification adequate for current environmental / weather conditions?				
Do portable ladders extend at least 4 feet above the excavation?				
Are portable ladders or ramps secured in place?				
Have all personnel attended safety meeting on excavation hazards?				
Are support systems for adjacent structures in place?				
Is the excavation free from standing water?				
Is water control and diversion of surface runoff adequate?				
Are employees wearing required protective equipment?				
ARCADIS Excavation Competent Person:			Date/Time:	

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1. POLICY

ARCADIS understands the hazards of personal exposure to lead. Based on this understanding, ARCADIS will implement the appropriate controls to minimize or eliminate the hazards of lead. These controls will focus first on engineering controls to mitigate lead hazards where appropriate and practical. Administrative controls may also be implemented as appropriate and practical. Where it is not appropriate or practical to implement engineering and administrative controls, personal protective equipment (PPE) will be implemented to control lead hazards below known occupational exposure limits.

2. PURPOSE AND SCOPE

2.1 Purpose

2.1.1 **Exposure to Lead** - This policy and associated procedures provides information to protect ARCADIS employees, subcontractors, and other effected personnel from exposures to lead while conducting work on ARCADIS projects.

2.1.2 **OSHA Standards** – This policy meets the requirements of the U.S. Occupational Safety and Health Administration (OSHA) regulations including Title 29 Code of Federal Regulations (CFR) Part 1910.1025 and Part 1926.62

2.2 Scope

This policy and the associated procedures apply to all projects where lead is known or thought to be present, and where ARCADIS employees, subcontractors and other effected personnel are or could be exposed to lead above the Action Level.

3. DEFINITIONS


Action Level is the airborne concentration established by OSHA that triggers certain regulatory requirements.

Authorized person means any person authorized by ARCADIS and required by work duties to be present in lead regulated areas.

Lead is a naturally occurring bluish-gray metal found in small amounts in the earth's crust. Lead can be found in all parts of our environment. Much of it comes from human activities including burning fossil fuels, mining, and manufacturing.

Lead has many different uses. It is used in the production of batteries, ammunition, metal products (solder and pipes), and devices to shield X-rays. Because of health concerns, lead from gasoline, paints and ceramic products, caulking, and pipe solder has been dramatically reduced in recent years.

Lead is encountered on ARCADIS projects as a contaminant in soils, ground and surface water, sediments, and other environmental media. It can also be encountered through the air where dusts containing lead are present. Personnel may also encounter lead in other forms at certain client facilities at which ARCADIS works. It can be encountered at mining and smelting operations, battery manufacturing facilities, chemical production facilities where metal coatings or plastics are manufactured and other types of industrial sites. In addition, other activities that may expose ARCADIS staff to lead include:

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- Demolition or salvage of structures where lead or materials containing lead are present;
- Removal or encapsulation of materials containing lead;
- New construction, alteration, repair, or renovation of structures, substrates, or portions thereof, that contain lead, or materials containing lead;
- Installation of products containing lead;
- Lead contamination/emergency cleanup;
- Transportation, disposal, storage, or containment of lead or materials containing lead on the site or location at which construction activities are performed, and
- Maintenance operations associated with the construction activities described in this paragraph.

High-efficiency particulate air [HEPA] filter means a filter capable of trapping and retaining at least 99.97 percent of mono-dispersed particles of 0.3 micrometers in diameter.

Permissible Exposure Limit (PEL) is an average airborne concentration regulatory limit established by OSHA above which requires control to protect people from adverse health effects.

Short Term Exposure Limit (STEL) is a PEL or TLV established as a limit of exposure measured over a designated period of time less than 8 hours.

Threshold Limit Value is a recommended average airborne concentration limit established by ACGIH. The TLVs are reviewed and updated as appropriate annually.


Time Weighted Average (TWA) is a measurement of airborne exposure to a chemical compound measured and averaged over a designated period of time for comparison to an STEL or an 8-hour PEL or TLV.

4. RESPONSIBILITIES

4.1 Project Managers are responsible, as part of the project hazard assessment, for determining if lead is or is potentially present on a project site. In addition, the project manager is responsible for determining client requirements with respect to the control of lead hazards. Project Managers notify health and safety staff when working on sites containing lead. Project Managers are also responsible for ensuring that project staff has the appropriate and applicable training for lead prior to those staff beginning work.

4.2 Corporate Health and Safety is responsible for keeping this policy and procedure up-to-date with current regulatory requirements and best practices. In addition, Corporate Health and Safety oversees the medical surveillance program for lead, as applicable and provides a lead training package to for presentation to appropriate staff.

4.3 Project Health and Safety Staff including designated Writers and Reviewers of Project Health and Safety Plans (HASPs) are responsible for developing control

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processes and techniques on specific projects based on the levels of lead expected to be encountered on project facilities.

4.4 Regional and Division HS Staff are responsible for supporting and assisting the project and task managers, and the project HS staff in the implementation of this policy and the associated procedures.

4.5 Project Personnel are responsible for completing lead training as required by this policy and procedure, and for following all hazard control processes designated by the Project Manager, Project Health and Safety Staff, and the project HASP. If project personnel believe that lead is present that was not previously identified or is at levels that are higher than expected, they should stop work and notify project health and safety staff or the project manager immediately and not proceed until authorized.

5. PROCEDURE

5.1 Lead Hazards

The health effects of lead are based on the type of exposure encountered by workers.


The primary route of exposure to lead in the work place is through inhalation of airborne lead. However, oral ingestion may represent a major route of exposure in contaminated workplaces. Most exposures occur with inorganic lead. Organic (tetraethyl and tetramethyl) lead, which was added to gasoline until the late 1970s, is not commonly encountered. Organic forms may be absorbed through the skin, while inorganic forms cannot.

Inorganic lead is not metabolized, but is directly absorbed, distributed and excreted. The rate depends on its chemical and physical form and on the physiological characteristics of the exposed person (e.g. nutritional status and age). Once in the blood, lead is distributed primarily among three compartments – blood, soft tissue (kidney, bone marrow, liver, and brain), and mineralizing tissue (bones and teeth). Absorption via the gastro-intestinal (GI) track following ingestion is highly dependent upon presence of levels of calcium, iron, fats, and proteins.

5.1.1 Exposure Limits and Regulated Areas

The following personal exposure limits are established for lead by inhalation:

- OSHA ACTION LEVEL – 30 micrograms per cubic meter of air ($\mu\text{g}/\text{m}^3$) lead in air 8-hour time weighted average (TWA).
- OSHA PERMISSIBLE EXPOSURE LEVELS (PELs)
 - TWA - 50 $\mu\text{g}/\text{m}^3$ lead in air averaged over an 8 hour period.
- ACGIH THRESHOLD LIMIT VALUES (TLVs)
 - TWA – 50 $\mu\text{g}/\text{m}^3$ lead in air averaged over an 8 hour period.

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- Personal exposure is the concentration of lead to which a person would be exposed if that person were not wearing respiratory protection. Personal exposures shall be measured over the exposure period in the breathing zone of the employee. Personal exposures should not be determined by area sampling.

- **REGULATED AREA**


An area where the lead exposure does or can be expected to exceed the PEL. Since it may be difficult to determine the exposure time for employees working in areas with concentrations that exceed PEL values, the facility/location may wish to regulate any area that exceeds the 8-hour TWA PEL.. Only Authorized Persons are permitted to enter regulated areas.

5.1.2 Actions for Employee Exposures Greater Than or Equal to the Action Level but Less Than the PELs

- Training – Annual lead training is required.
- Medical Surveillance – Initial and annual medical exams (see below) are required if employee personal exposures do or can be reasonably expected to exceed the Action Level on at least 30 calendar days during the coming year.
- Periodic Monitoring – shall be conducted at least annually until at least two consecutive exposure determinations (no less than 7 days apart) indicate the exposure is below the Action Level.

5.1.3 Actions for Employee Exposures Greater Than PELs

- Respiratory Protection – a minimum of full face air-purifying respirators equipped with HEPA filters shall be used in all regulated areas.
- Training – Annual lead training is required.
- Medical Surveillance – Initial and annual medical exams (see below) are required if employee personal exposures do or can be reasonably expected to exceed the PEL on a least 10 calendar days during the coming year.
- Written Program – A written program to reduce personal exposure is required detailing the methods to be used to reduce exposures below the PEL. These written programs will be in the form of the project HASP based on project-specific and client requirements. The HASP will indicate the schedule for the implementation of the any lead-related hazard control processes or methods. The HASP is reviewed periodically but at least annually per the ARCADIS SOP ARC HSFS010 – Health and Safety Plans. All project personnel have access to the project HASP at all times.
- Periodic Monitoring – at least every 6 months until at least two consecutive exposure determinations (no less than 7 days apart) indicate the exposure is below the PEL;

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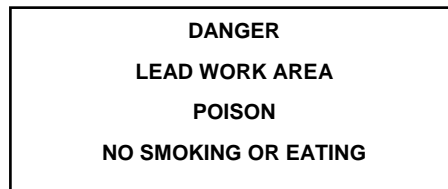
then annually until at least two consecutive exposure determinations (no less than 7 days apart) indicate the exposure is below the PEL Action Level.

5.1.4 Exposure Monitoring

- Representative personal exposure monitoring is required for each type of operation involving the handling of or potential exposure to lead.
- Initial monitoring can be omitted if there is documented data or industrial hygiene calculations to demonstrate that exposures are below the action level.
- Personal exposure monitoring shall utilize standard industrial hygiene sampling techniques and recordkeeping.
 - Employees who have been monitored for lead exposure shall be notified of the monitoring results within 15 working days of receipt of these results . If the PEL is exceeded, the notification must indicate the follow-up plans or corrective actions to be taken to reduce exposures to below the PEL.
- Personal TWA monitoring can be used for extended tasks, such as soil and sediment sampling, working on mine sites where lead is present, where clients require monitoring, etc.
- Area sampling can be used to determine regulated areas;
- Periodic Monitoring is required if exposures exceed the Action Level or PELs.


5.1.5 Requirements for Regulated Areas

- Posting – Regulated areas shall be indicated such as by barricades, barricade tape, painted demarcations, or other devices.
- A sign shall be posted at the access to the regulated area with the warning:



[Minimum lettering height: DANGER LEAD WORK AREA 4"; others 3"]

- Respiratory Protection – Respirators shall be worn by all personnel when in a regulated area, regardless of the time period or over-all personal exposure measurement.
- Labeling:

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- In addition to appropriate Hazard Communication labeling, containers or equipment containing lead or lead compounds must also be labeled as such:

CAUTION

ITEMS CONTAMINATED WITH LEAD


DO NOT REMOVE DUST BY BLOWING OR SHAKING

DISPOSE OF LEAD CONTAMINATED MATERIALS AND WASH WATER IN ACCORDANCE WITH LOCAL, STATE (PROVINCIAL) OR FEDERAL REGULATIONS

- Eating, drinking, smoking, chewing any item, or applying cosmetics is strictly prohibited in a lead regulated area.

5.1.6 Exposure Reduction

- Written Program:
 - The Project Manager and the Project Health and Safety Staff will develop a written program and make a determination as to the initial exposure levels to be included in the project HASP for exposure reduction if there is a determination that employee exposures may exceed the OSHA Action Level. The HASP will be reviewed at least annually. The program must include:
 - The locations and operations of potential lead exposure
 - Means to achieve compliance
 - Available air monitoring data or industrial hygiene estimates of airborne concentrations
 - Schedule for implementing control procedures
 - Exposure control processes
 - Medical surveillance requirements
 - Training requirements
 - Emergency response
 - The written program must list the corrective actions that will be taken to reduce employee exposure to at or below the OSHA Action Level:
 - identify regulated areas/tasks and the operations where lead may be encountered;

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- the specific means to achieve compliance with OSHA, client, and other applicable requirements;
 - engineering controls;
 - revised work practices;
 - respiratory protection and protective clothing; and
 - schedule of development and implementation.
- Spills and Emergencies:

An emergency is any occurrence which may result in an unexpected significant release of lead or lead-containing compounds that may result in a significant inhalation. After an emergency, appropriate monitoring must be conducted to assure the ambient lead levels are back to normal; and conduct appropriate medical surveillance for affected employee(s).

- Respiratory Protection and Personal Protective Equipment:
 - Respirators shall be worn, maintained and managed in accordance with the OSHA standard, 29 CFR 1910.134 and ARCADIS SOP ARC HSGE017 – Respiratory Protection. In addition, any client requirements on project sites will be followed.
 - Respiratory protection will be worn in all areas as determined in the project HASP and per client requirements. Respirators will be at a minimum, full-face air purifying respirators equipped with HEPA filters.
 - Protective clothing will be worn per the requirements of the client or the project HASP and will include at a minimum at or above the OSHA Action Level:
 - Coveralls
 - Gloves
 - Hood
 - Boots and boot covers
 - Face shield (depending on operation)
 - Goggles

- Ventilation Systems:

Where appropriate, ventilation systems will be utilized to control the level of airborne lead per the client and HASP requirements. These ventilation systems will be equipped with HEPA filtration and be maintained to ensure effective collection of the lead particulate. Personnel who maintain these systems and change the filters will be appropriately protected per this policy and procedure to minimize exposure.

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- **Personal Hygiene:**


Where lead is present at any level, project personnel handling such media containing lead will wear gloves to minimize exposure of lead to the skin that can then be transferred to the mouth. In all areas where lead is present, personnel will dutifully wash their hands and face before leaving the area to eat, drink, smoke, chew or apply cosmetics. Decontamination and changing facilities will be provided as necessary. In situations as indicated in the project HASP, PPE will be worn to protect the skin from exposure. However, even where PPE is worn, hand and face washing is required.

5.1.7 Medical Surveillance

- Initial medical surveillance is required:
 - If employee personal exposures are reasonably expected to exceed the Action Level on at least 30 calendar days per year; or
 - If employee personal exposures are reasonably expected to exceed the PEL on a least 10 calendar days per year.
- Periodic exams are required on an annual basis for employees who continue to meet the criteria listed above. Annual exams may be discontinued after the exam conducted the year after personal exposures fall below the limits stated above in this section.
- The specific medical exam requirements are explained in detail in ARCADIS SOP ARC HSGE010 - Medical Surveillance. In addition, ARCADIS will work with WorkCare to ensure the proper medical surveillance, testing and notification is completed related to exposure to lead. This includes timing of sampling (e.g., at least every 6 months to each covered employee; at least every two months for each employee whose last blood sampling and analysis indicated a blood lead level at or above 40 ug/100 g of whole blood; and at least monthly during the removal period), treatment if levels are elevated (e.g., temporary removal from the site), and employee notification (i.e., within 5 days of levels are not acceptable).
- The physician must be supplied a copy of the OSHA lead regulation 29 CFR 1910.1025 and a description of the employee's lead exposure.
- For employees exposed to lead from an emergency, ARCADIS will immediately call WorkCare and follow all instructions for treatment and testing

6. TRAINING

Initial lead training is required for all employees assigned to a work area suspected or known to contain lead. This training can be accomplished at the project orientation prior to the initiation of site work.

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Annual lead training is required at a minimum for all employees actually or potentially exposed to greater than the Action Level.

Initial and annual training shall consist of:


- The operations that involve lead exposure.
- The methods/observations that can be used to detect the presence or release of lead
- The physical and health hazards of lead.
- Methods used to protect against the hazards of lead including PPE and respiratory protection.
- The proper use of personal protective equipment in emergency situations.
- The meaning of a regulated area and how such are demarcated.
- A review of the applicable standard and where copies can be found.
- An explanation of the medical surveillance program and an employee's right to access medical and exposure records.

7. REFERENCES (regulation citation, technical links, publications, etc.)

- OSHA 29 CFR 1910.1025 – Lead
- OSHA 29 CFR 1926.62 – Lead
- ACGIH 2006 TLVs and BEIs – Threshold Limit Values for Chemical Substances and Physical Agents & Biological Exposure Indices
- ARCADIS Medical Surveillance SOP – ARC HSGE006
- ARCADIS Respiratory Protection SOP – ARC HSGE017

8. RECORDS

- All exposure, medical, and training records shall be kept for 40 years or at least 20 years past the last date of employment.
- All exposure and medical records shall be made available to appropriate regulatory agencies upon written request.
- Employees who have been monitored for lead exposure shall be notified of the monitoring results within 15 working days of receipt of these results; a written request is not required

	<u>ARCADIS HS Procedure Name</u> Lead	<u>Revision Number</u> 03
<u>Implementation Date</u> 26 March 2007	<u>ARCADIS HS Procedure No.</u> ARC HSFS007	<u>Revision Date</u> 12 February 2009
<u>Author</u> Pat Vollertsen	Page 10 of 10	<u>Approver</u> Michael Thomas


9. APPROVALS AND HISTORY OF CHANGE

Michael A. Thomas, CIH, Director H&S Environmental Division

Michael A Thomas

History of Change

Revision Date	Revision Number	Reason for change
26 March 2007	01	Original Document
6 September 2007	02	Changing to new template format
12 February 2009	03	Changing to new template format

	<u>ARCADIS HS Procedure Name</u> Personal Protective Equipment	<u>Revision Number</u> 01
<u>Implementation Date</u> 20 February 2009	<u>ARCADIS HS Procedure No.</u> ARC HSGE015	<u>Revision Date</u> 20 February 2009
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1. POLICY

It is the policy of ARCADIS to assess the workplace to identify and assess hazards in order to appropriately implement controls for those hazards. In addition, it is ARCADIS policy to supply personal protective equipment (PPE) for employees in a working environment where engineering and administrative controls are not feasible or effective in the control of hazards. ARCADIS will train and supply this PPE at no cost to the employee.

2. PURPOSE AND SCOPE

2.1 Purpose

The purpose of PPE is to shield or isolate individuals from the chemical, physical, and biologic hazards that may be encountered in their work environment. A hazard analysis or assessment will be performed before a job task is begun to evaluate the if PPE is necessary to protect an employee from identified hazards and determine the type of PPE required. This analysis will include the identification of hazards/suspected hazards and their routes of exposure.

Combinations of protection may be needed to provide the appropriate level of protection for any given work environment. The level of PPE may change during a job, so periodic evaluation will be done to ensure that the most appropriate PPE is being used. Over-protection, as well as under-protection, can be hazardous and should be avoided where possible.

Subcontractors and other non-ARCADIS employees must supply their own PPE. ARCADIS will not supply PPE to any non-ARCADIS employees unless specific arrangements and agreements are made with the other party.

This Health and Safety Procedure (HSP) provides guidance on the proper selection, use, care and maintenance of PPE.


2.2 Scope

Whenever possible, engineering, substitution, and administrative controls will be used to reduce or eliminate hazards, but when they are not feasible, practical or adequate, PPE will be used to protect employees from exposure to hazards during ARCADIS-related work tasks.

3. DEFINITIONS

Eye/Face Protection - Equipment designed to provide eye or face protection when exposed to hazards from flying particles, molten metal, liquid chemicals, acids or caustic liquids, chemical gases or vapors, or potentially injurious light radiation.

Foot Protection - Footwear designed to provide foot and toe protection when working in areas where there is a danger of foot injuries due to falling or rolling objects, or objects piercing the sole, and/or where an employee's feet are exposed to electrical hazards. These include such measures as steel toe, metatarsal, and boot warmers

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Hand and Body Protection - Equipment designed to provide protection to the hands and body during exposures to potential hazards such as potential for skin absorption of harmful substances, sharp objects, abrasive surfaces, punctures, temperature extremes and chemical contact.

Hazard Assessment - The process utilized to identify hazards in the workplace and to select the appropriate PPE to guard people against potential hazards (see attachment Hazard Assessment for Personal Protective Equipment (PPE)).

Head Protection - Equipment designed to provide protection to the head during exposure to potential hazards such as falling objects, striking against objects, or electrical hazards.

Hearing Protection - Equipment designed to provide protection to an individual's hearing during exposure to excessive noise levels and any 8hr work day with noise levels consistently 85dB or above.

Personal Protective Equipment (PPE) - Equipment designed to provide protection to the wearer from potential hazards to the eyes, face, hands, head, feet, ears, extremities, and respiratory system.

Respiratory Protection - Equipment designed to provide protection to the wearer from potential inhalation hazards such as vapors, mists, particulates, and gases.

4. RESPONSIBILITIES

4.1 ARCADIS Management


Is responsible for providing resources for the acquisition of PPE and for the conduct of hazard assessments.

4.2 Project Managers

Project Managers are responsible, as part of the project hazard assessment, for determining PPE necessary to complete the project. In addition, the project manager is responsible for determining client requirements with respect to PPE. Project Managers notify health and safety staff of biological, chemical, and physical hazards present or potentially present on the site.. Project Managers are also responsible for ensuring that project staff has the appropriate and applicable training for PPE use prior to those staff beginning work.

4.2 Corporate Health and Safety

Corporate Health and Safety is responsible for keeping this policy and procedure up-to-date with current regulatory requirements and best practices and for assisting in determining the appropriate PPE for a particular task and work environment and for assisting in the identification of appropriate vendors of such PPE.

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4.3 Health and Safety Staff

Project Health and Safety Staff including designated Writers and Reviewers of Project Health and Safety Plans (HASPs) are responsible for developing control processes and techniques on specific projects based on the physical, chemical, and biological hazards expected to be encountered on project facilities.

4.4 ARCADIS Staff

ARCADIS staff are responsible for completing PPE training as required by this policy and procedure, and for following all hazard control processes designated by the Project Manager, Project Health and Safety Staff, and the project HASP. If project personnel believe that a hazard is present that was not previously identified or is at levels that are higher than expected, they should stop work and notify project health and safety staff or the project manager immediately and not proceed until authorized.

5. PROCEDURE

5.1 Minimum PPE Requirements

All staff who regularly conduct field work or visit project sites outside of office environments will be issued a field bag that contains, at a minimum, the following PPE:

- An ARCADIS logo'd hardhat
- Two pair of safety glasses, one clear pair and one tinted pair, or one pair of prescription safety glasses with transitional lenses
- Hearing protection
- A minimum, Type 2 reflective vest in either orange, lime green or yellow
- Steel toe safety boots


Office locations will stock extra bags with the equipment listed above for use by other staff who do not regularly go to field locations. Additional PPE and H&S equipment will be issued to staff based on the hazards they face on specific projects (i.e. respirators, goggles, chaps, etc.).

No ARCADIS staff should arrive at a field or project site without this minimum PPE.

5.2 The PPE Program

The basic objectives of a PPE program are to protect the wearer from safety and health hazards; and to prevent injury to the wearer from incorrect use and/or malfunction of the PPE. This document serves as the overall ARCADIS PPE program and is used as guidance for the development of a project-specific PPE program which becomes part of a project-specific health and safety plan. A project-specific PPE program in combination with this HSP will address the following:

- PPE selection based upon site hazards (Hazard Identification/Assessment).

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- Identify the hazards/suspected hazards and their potential routes of exposure (e.g., skin, inhalation, ingestion or eye contact).
- The use and limitations of the equipment including limitations during temperature extremes and under certain medical conditions;
- The work mission duration;
- Maintenance, storage, decontamination and disposal of PPE;
- Training including proper fit and how to properly put on and take off PPE;
- PPE inspection procedures prior to, during, and after use; and
- Periodic evaluation of the effectiveness of the PPE program.

5.3 PPE Selection

The use of PPE can itself create significant worker hazards, such as heat stress, physical and psychological stress and impaired vision, mobility and communication. Over-protection, as well as under-protection, can be hazardous and should be avoided where possible. Site or project-specific health and safety plans take into consideration engineering, substitution, and administrative controls first as a means to eliminate/reduce the need for PPE. When it is not feasible or practical to eliminate the use of PPE, PPE selection will be based on an evaluation of the performance characteristics of the PPE relative to the following:

- The requirements and limitations of the tasks or work environment;
- The task-specific conditions and duration; and
- The hazards and potential hazards identified at the site.


The level of protection will be increased whenever it is shown that increased protection is necessary to reduce employee exposures to the hazards. It may be decreased when it is shown that this will not result in hazardous exposure to employees.

5.4 Levels of PPE Protection

For work on hazardous sites, a combination of PPE may be categorized into levels A, B, C, or D with level A offering the highest level of protection and D the lowest. Monitoring the effectiveness of PPE will be done throughout a project to ensure that the appropriate level of protection is being worn. These levels of protection are described below.

Level A Protection

Level A PPE offers the highest level of respiratory and skin protection and should be worn when:

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- The hazardous substance has been identified and requires the highest level of protection of the skin, eyes, and respiratory system based on either:
 - The measured (or potential) high concentrations of atmospheric gases, vapors, or particulates; or
 - If site operations and work functions involve a high potential for splash, immersion, or exposure to unexpected vapors, gases, or particulates which are harmful to skin eyes, or the respiratory system.
- There is a known or suspected high degree of hazard to the skin and skin contact is possible.
- Conducting work in a confined, poorly ventilated area and the other criteria requiring Level A PPE have not been determined.


Level A equipment includes:

- NIOSH approved positive pressure, full-face piece self contained breathing apparatus (SCBA), or positive pressure supplied airline respirator with escape SCBA;
- Totally encapsulating chemical-protective suit (material based on the hazard);
- Chemical resistant outer **and** inner gloves (type and material based on the hazard);
- Chemical resistant boots with steel toe and shank;
- Disposable protective suit, gloves and boots (depending on suit construction, may be worn over the totally encapsulating suit);
- Coveralls (optional, as applicable);
- Long underwear (optional, as applicable); and
- Hard-hat - under suit (optional, as applicable).

Level B Protection

Level B PPE offers a high degree of respiratory protection with lesser levels of skin protection. Level B PPE should be worn when:

- The type and atmospheric concentration of substances have been identified and require a high level of respiratory protection but less skin protection;
- The atmosphere contains less than 19.5 percent oxygen; or
- The presence of incompletely identified vapors or gases is indicated by direct reading organic vapor detection instruments, but the vapors and gases are not suspected of

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containing high levels of chemical harmful to the skin or capable of being absorbed through the skin. Level B is the minimum level of protection that should be worn when there is insufficient information to determine the hazards or potential hazards of the substance.

Level B PPE equipment includes:

- NIOSH approved positive pressure, full face piece self contained breathing apparatus (SCBA), or positive pressure supplied air respirator with escape SCBA;
- Hooded chemical resistant clothing (overalls and long sleeve jacket; coveralls; one or two piece chemical splash suit; disposable chemical resistant overalls) (materials based on the hazards);
- Chemical resistant outer **and** inner gloves (material based on the hazards);
- Chemical resistant boots with steel toe and shank;
- Coveralls (optional, as applicable);
- Outer chemical resistant boot covers (optional, as applicable);
- Hard hat (optional, as applicable); and
- Face shield (optional as applicable).


Level C Protection

Level C PPE is used when the concentration and type of airborne substance is known, and the criteria for using an air purifying respirator are met. It should be worn when:

- Atmospheric contaminants, liquid splashes, or other direct contact will not adversely affect or be absorbed through any exposed skin;
- The types of air contaminants have been identified, concentrations measured, and an air purifying respirator is available that can remove the contaminants; and
- All criteria for the use of an air purifying respirator are met.

Level C PPE equipment includes:

- NIOSH approved full face or half mask air purifying respirator (with appropriate cartridges based on the hazards);
- Hooded chemical resistant clothing (overalls and long sleeve jacket; coveralls; one or two piece chemical splash suit; disposable chemical resistant overalls) (materials based on the hazards);

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- Chemical resistant outer **and** inner gloves (materials based on the hazards);
- Chemical resistant boots with steel toe and shank;
- Coveralls (optional, as applicable);
- Outer chemical resistant boot covers (optional, as applicable);
- Hard hat (optional, as applicable);
- Escape mask (optional, as applicable); and
- Face shield (optional, as applicable).

Level D Protection


Level D PPE offers the least skin and respiratory protection and should be worn when the atmosphere contains no known hazards, and work functions preclude splashes, immersions or the potential for unexpected inhalation of or contact with hazardous levels of any chemicals.

Level D PPE equipment may include any or all of the following depending on the hazards of the site:

- Chemical resistant boots with steel toe and shank (optional, as applicable);
- Coveralls (optional, as applicable);
- Gloves (optional, as applicable);
- Outer chemical resistant boots (disposable) (optional, as applicable);
- Safety glasses or chemical splash goggles (optional, as applicable);
- Hard hat (optional, as applicable);
- Escape mask (optional as applicable); and
- Face shield (optional as applicable).

5.5 Combinations of Protection

Combinations of protection are acceptable if the task hazard analysis and the site conditions warrant modification of PPE levels.

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5.6 Equipment List

Eye/Face Protection

All employees engaged in or working in or adjacent to areas with eye-hazardous activities or operations, such as but not limited to flying objects and hazardous chemicals shall wear appropriate eye protection.

- Safety glasses with side shields are required for impact protection and shall meet ANSI Standard Z87.1 requirements.
- Chemical goggles (for protection against chemical splash).
- Face shields (for face protection from chemical splash and are not a substitute for primary eye protection).
- Full-face respirators can provide eye and face protection in lieu of safety glasses, goggles, or face shields.
- Shaded eye protection meeting the minimum shade requirements established in 29 CFR 1910.133 (for employees exposed to sources of injurious light radiation [e.g., welding, cutting, lasers]).
- For prescription eye protection contact your supervisor to fill out an AOSafety order form available on APEX.

Respiratory Protection


Respirators will be provided and used in accordance with the ARCADIS Respiratory Protection Policy/Procedure ARC HSGE017 and 29CFR 1910.134.

Hearing Protection

Hearing protection will be provided and used in accordance with the ARCADIS Hearing Conservation Policy/Procedure ARC HSIH008 and 29CFR 1910.95.

Foot Protection

- Basic foot protection is required for all ARCADIS job sites and industrial locations. Specialized footwear will be provided as required by the nature of the work. Special foot protection may include, but is not limited to, chemically resistant, thermally shielded, metatarsal guards, etc.
- Leather Safety Boots will be provided for employees; one pair of leather safety boots will be provided as necessary by ARCADIS. The employee purchasing the footwear is required to ensure that it meets ANSI Standard Z41.
- For most work done by ARCADIS, safety boots will be equipped with steel toes and shanks. It is also required that puncture resistant soles or in-soles are equipped in the safety boots. Some clients require puncture resistant soles or in-soles.

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- The maximum expenditure or reimbursement for approved safety shoe purchases will be \$150. Reimbursement requests must be approved by the employee's supervisor.
- Athletic-style safety shoes ("safety sneakers") are prohibited (due to the difficulties created by these styles in supervising proper use of protective footwear).

Head Protection

Hard hats meeting ANSI Z89.1 will be provided to protect employees from impact, penetration, falling objects, and/or limited electrical shock and burn, as appropriate for work site hazards. A hard hat must be replaced when it becomes damaged, contaminated (and contamination cannot be removed) or it has been struck by an object of sufficient size to potentially compromise its integrity.

Hardhats must resist penetration by objects, be water resistant and slow burning, and have a chin strap if it is worn while working at elevation. It must be worn square on the head and not be pushed back, to the side or forward.

There are two types and three classes of head protection described in ANSI standard Z89.1-1997. The types and classes are divided by the protection they provide from impact and electricity. It is important that the level of protection necessary be evaluated when during preparation of the site specific HASP.

Other hazard situations to consider are:


- In areas of heavy vegetation or in any area where hunters may be present, it is recommended that some type of brightly colored head protection be worn. For example, a bright orange or yellow baseball cap or stocking cap.
- If cold exposure is an issue, hardhat liners are available (made specifically for the particular hardhat) or if a hardhat is not required, some type of insulated head protection such as a stocking cap should be worn.

Hand Protection

Appropriate hand protection will be provided if employee's hands are exposed to hazards while on the job.

such as:

- pinch points
- sharp/pointed tools or objects
- incorrect or inadequate tool use
- improper use
- rotating/energized/automated parts
- abrasive materials

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- inadequate job planning
- lack of/inadequate protection
- changing weather conditions and extreme temperatures
- hazardous material
- jewelry and loose clothing.

Once these hazards are identified, the appropriate glove or hand protection must be selected. When choosing gloves, keep in mind:

- Hazardous Chemicals/Substances to be Contacted
- Nature of Contact (total immersion, splash, etc.)
- Duration of Contact
- Area of Protection (hand only, forearm, arm)
- Equipment (rotating, sharp edges, etc.)
- Grip (dry, wet, oily)
- Thermal Protection
- Abrasion/Cut/Puncture Resistance
- Tear/Tensile Strength
- Ergonomics (size, heat stress, dexterity)
- Decontamination/Disposal


In selecting chemically protective gloves, the toxic properties of the chemical(s) will be determined. Information provided on the manufacturer's label or by chemical compatibility charts regarding breakthrough time, permeation rate, and degradation should be considered during selection.

Body Protection

Protective clothing, gloves, boots, and other protective equipment will be provided as appropriate for the hazards associated with the tasks being performed.

Long pants are required for all field work unless approval is granted by corporate H&S. . Additional protection such as cooling vests may be required. In environments with potential biological hazards such as ticks, plants or snakes, gloves and long sleeves should be worn along with head protection of somekind to protect the scalp. In areas of roadway work or other vehicle traffic high visibility Class II safety vests will be worn.

Chemically Protective Clothing (CPC) will be selected by evaluating the performance characteristics of the CPC against the requirements and limitations of the site and task-

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specific conditions. This selection should be performed by an employee with training and experience taking into consideration:

- Permeation, degradation, penetration of the CPC by the chemical and;
- Durability, flexibility, fit, temperature effects, ease of decontamination, compatibility with other necessary equipment (e.g., hardhats, SCBA, etc.); and duration of use that could effect the employees ability perform the task.

Specialized Equipment

All other specialized safety equipment required for an assignment (e.g., work gloves, specialized protective clothing, hip boots, field rain gear, personal floatation devices) will be provided by the Firm as specified in the HASP.

Extreme Cold Environments

Supervisors will provide as necessary any of the following to protect from extreme cold environments:

- Hats/hat liners and gloves
- Thermal clothing
- Hi-Visibility clothing
- Winter footwear

Use of specialized equipment will be charged to projects in accordance with established policy and rental rates.

5.7 Maintenance/Storage/Disposal

PPE Maintenance and Disposal


PPE must be inspected by the user before and after each use for defects, rips, tears, and/or damaged parts. Damaged or compromised PPE will not be used and must be repaired before re-use or disposed. PPE must be disposed of according to the HASP and other project plans for the site. If non-disposable, PPE must be decontaminated and sanitized before being reused according to the HASP Contaminated PPE which cannot be properly decontaminated by normal procedures must be disposed of accordingly.

PPE Storage

All PPE must be stored to protect against dust, sunlight, extreme heat and cold, excessive moisture, and damaging chemicals. Storage must be in accordance with the manufacturer's specifications.

Contaminated Boots

Boots contaminated or damaged on the job will be replaced. Contaminated boots will be disposed of with the site waste.

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6. TRAINING

Training in the proper use of PPE will generally be provided in conjunction with HAZWOPER training or via coursework selected and approved by Corporate H&S. Training will be completed prior to the employee's use of PPE, when changes in the work place alter the use or type of PPE, and when inadequacies in the employee's knowledge or use of PPE are noted.

The training will include at a minimum:

- When and what PPE is necessary;
- How to put on, adjust, wear and take off the PPE;
- Limitations of the PPE; and
- Proper care, maintenance, useful life, and proper disposal of PPE.

7. REFERENCES

- 29 CFR 1910.120 "Hazardous Waste Operations and Emergency Response"
- 29 CFR 1910 Subpart I "Personal Protective Equipment"

8. RECORDS

Records of the PPE training are retained by the Employee and in the ARCADIS training database. Medical certification/recertification are retained by Corporate H&S.


9. APPROVALS AND HISTORY OF CHANGE

Approved by: Michael A. Thomas, CIH, Director H&S Environmental Division



History of Change

Revision Date	Revision Number	Reason for change
20 February 2009	01	Original document

	<u>ARCADIS HS Procedure Name</u> Roadway Work Zone Safety, Traffic Control and Employee Safety on Private Roadways and Parking Areas	<u>Revision Number</u> 1
<u>Implementation Date</u> January 4, 2010	<u>ARCADIS HS Procedure No.</u> ARC DOT-302	<u>Revision Date</u> January 4, 2010
<u>Author</u> Sam Moyers	Page 1 of 7	<u>Approver</u> Mike Thomas

1. POLICY

It is the policy of ARCADIS that employees performing work in or adjacent to private roadways or in parking areas be adequately protected from vehicular and equipment traffic.

2. PURPOSE AND SCOPE

2.1 Purpose

This procedure provides guidance to employees on ARCADIS requirements for protection from site traffic on private roadways and work in parking areas not under the control of DOT or similar jurisdiction. This procedure provides requirements for preparation of a Site Traffic Awareness and Response (STAR) Plans for private property traffic control and management. This procedure also provides guidance on general H&S issues associated with safety and training requirements.

2.2 Scope

This procedure is specific to ARCADIS work performed in private roadways and parking areas. Work zone safety and traffic control on public roadways is addressed in the ARCADIS H&S Procedure ARC DOT-301, "Traffic Control and Employee Safety on Public Roadways" (ARC DOT-301).

This procedure does not address work on airport or railroad property where exposure to plane or train traffic is expected.

If the client has more restrictive requirements than what is presented in this procedure, the more restrictive requirement will apply.


3. DEFINITIONS

Engineering Judgment - The evaluation of available pertinent information and the application of appropriate principles, standards, guidance, and practices as contained in the Manual on Uniform Traffic Control Devices (MUTCD) and other sources, for the purpose of deciding upon the applicability, design, operation, or installation of traffic control devices. Engineering Judgment shall be exercised by a qualified engineer, or by an individual working under the supervision of a qualified engineer, through the application of procedures and criteria established by the engineer.

Client Site - Any portion of the client's facility under the control of the client and is not part of the public right of way. Excludes airports and railroad property where exposure to plane or train traffic is expected..

"Must", "Shall" and "Will" – means the requirement is mandatory. This definition also applies to equivalent terms in DOT Fact Sheets associated with this procedure.

Parking Area or Parking Lot – Any portion of the client site designated for parking vehicles or equipment. Paved or unpaved completion.

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Reasonable Time and Place - A condition where the employee conducting the required task is permitted to perform the task in a rested state, free from any condition that would compel the employee to hurry through the assigned task due to:

- Work schedule,
- Budget, and/or
- Mandate requiring the task be performed during times normally considered by employees to be free of any obligation to perform work on behalf of ARCADIS (vacation, holidays, etc.)

Roadway – That portion of a road improved, designed, or ordinarily used for vehicular travel and parking lanes, but exclusive of the sidewalk, berm, or shoulder.

“Should” and “May” – Means the requirement is recommended, if the requirement(s) is not in conflict with an applicable regulatory or client requirement(s). This definition also applies to equivalent terms in DOT Fact Sheets associated with this procedure.

STAR Plan – A plan for the control and management of traffic on private roadways or parking areas for the protection of project workers. The term includes any requirements presented in project specific HASPs, Job Loss Analyses (JLAs), and/or in a STAR Plan template.

Temporary Traffic Control Zone – An area of a highway where road user conditions are changed because of a roadway work zone or incident by the use of temporary traffic control devices, flaggers, uniformed law enforcement officers, or other authorized personnel.

Traffic Control Device – A sign, signal, marking, or other device used to regulate, warn, or guide traffic, placed on, over, or adjacent to a street, highway, pedestrian facility, or shared-use path by authority of a public agency having jurisdiction.

4. RESPONSIBILITIES


4.1 Corporate Health and Safety

Corporate Health and Safety (through the DOT Compliance Manager) has the overall responsibility for the development, revision and maintenance of the ARCADIS DOT Program for Work Zone Safety.

4.2 Managers and Supervisors

Each ARCADIS Manager acting in a Project Manager or Task Manager responsibility, over projects involving STAR work, will steward the DOT Program for Work Zone Safety and audit, to the extent necessary, each project team member's compliance with this program. Each affected manager will:

- Ensure financial resources and appropriate time scheduled to adequately construct and implement required STAR Plans,

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- Make employees that are responsible and accountable for implementing any STAR Plan requirements available at a reasonable time and place to review the relevant STAR Plan and provide an opportunity for the employees to ask questions regarding the plan's content.
- Hold employees implementing STAR Plan requirements accountable if found in non compliance with the STAR Plan requirements.
- Make employees responsible for the development of STAR Plans available at a reasonable time and place to obtain any required training mandated by this procedure or by federal or state regulation.

4.3 Employees

Each Employee having a responsibility to implement any aspect of a STAR Plan will follow the STAR Plan as instructed. Employees have the absolute right to stop work if asked to perform work (either by ARCADIS or the client) in a manner inconsistent with the STAR Plan. If deviations from the STAR Plan are necessary due to site or other conditions, these deviations will be documented.

5. PROCEDURE

5.1 General


All work performed on or adjacent to private roadways and parking areas will be conducted in a manner that will protect workers from site traffic. Requirements for private property traffic control will be addressed in the project specific HASP, JLA or in the STAR Plan template. Elements of the STAR Plan must be consistent with:

- The ARCADIS DOT Program for Roadway Work Zone Safety; and/or
- Any applicable client requirement relating to facility traffic control;

All employees working in a STAR area must have protection from traffic hazards beyond the use of personal protective equipment (PPE). This includes any work in a Temporary Traffic Control Zone on a private roadway or in a parking lot. Each STAR Plan will address the specific project methods and equipment to be used to address employee protection beyond PPE.

The STAR Plan is considered an extension of the project specific HASP. An ARCADIS STAR Plan Template is available on the DOT Team Site and in the HASP section of the Health and Safety Team Site of the APEX to facilitate adherence to this procedure, however, use of the template is not mandatory as long as effective written controls are addressed in the HASP or JLA for the project.. Alternate formats of a standalone STAR Plan are acceptable if a specific format is required by a client.

The STAR Plan template, if utilized, will be included as an appendix to the HASP for use by employees in the field.

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5.2 Relationship of STAR Plan Requirements to the DOT MUTCD

STAR design and layout used should be consistent with the MUTCD to the extent practical. Traffic control devices used for traffic control on private roadways and parking areas will meet MUTCD requirements for color, shape, reflectivity, and design.

5.3 Relationship of STAR Plan to Traffic Control Plan (TCP) Requirements for Public Roadways


Project sites with on-site activities requiring development of a STAR Plan and also having off-site activities requiring a TCP, may have all requirements for both on-site and off-site traffic control presented in a TCP that is reviewed and approved by an employee with Engineering Judgment. See ARC DOT-301 for more information.

5.4 STAR Plan Requirements

5.4.1 Required STAR Plan Elements

Each project specific STAR Plan will be in writing (computer generated or hand written) and will contain the following elements:

- General Project Information (see note below)
 - Project name;
 - Project number;
 - Name of individual responsible for developing the STAR Plan;
 - HASP Reviewer name;
 - Name of individual responsible for implementing the STAR Plan (“TBD” or similar entry is not permitted). Back up persons may also be provided if they meet the requirements of this procedure.
- Project Description (see note below)
 - A brief description of the work to be performed, including estimated durations of time the worker will be in the roadway or parking area.
- Anticipated vehicles or equipment expected to be encountered on the client site.
- STAR Layout
 - A narrative or pictorial (created by drafting or legibly hand drawn) description, of the traffic control device layout. Compliance may be achieved by:
 - Attaching the applicable DOT Facts 301 or 302 series fact sheet(s) to the STAR Plan; or

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- Attaching the relevant diagram, drawing or narrative from client specific documents; or
 - Attaching a specific legible drawing relevant to the condition expected to be encountered during project work.
 - Manual revisions of the above documents are authorized to ensure project specific control.
- Indication of the traffic control devices, as appropriate and applicable, to be used on the project:
 - Number of warning signs including wording to be used on the signs.
 - Number of cones, barrels, etc.
 - Number of flaggers, etc.
- Approvals (see note below)
 - Signature and date STAR Plan developer.
 - Signature of HASP Reviewer (an employee with Engineering Judgement may also approve a STAR Plan even if not designated as a HASP Reviewer).
- Reviews (see note below)
 - Signature and of each employee performing work within the private roadway or parking area


Note: Information does not need to be duplicated if embedding the STAR Plan requirements within a HASP or JLA (project numbers, names, signatures, etc).

5.5 General PPE Requirements

Each employee will wear, at a minimum, a Class II reflective vest meeting ANSI 107-1999 requirements either orange or lime green in color (the latter color is preferred). A Class III reflective vest is required if night work.

Other required PPE includes:

- Safety glasses;
- Hard hat;
- Sturdy boot with ankle support (steel toe may be required based on project safety requirements); and
- Other PPE, including any other required high visibility clothing, required by the project specific HASP, JLA or STAR Plan template will also be worn, as specified.

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5.6 Cone Requirements

Cones used in parking areas will meet recommended height and visibility requirements in DOT Facts-302b. At least one 42 inch high channelizer cone will be available at each work location in the parking area. Cones may be augmented with flags to increase visibility.

5.7 Use of Safety Fencing and High Visibility Caution Tape

Use of orange safety fencing and/or high visibility caution tape is recommended for static work activities in parking areas having durations greater than 1 hour per location. These devices may be used for shorter duration work if specific pedestrian control is required. Example work activities where use of these devices is recommended include, but is not limited to:

- Drilling operations;
- Excavation operations; and/or
- Long term aquifer testing activities.

Use of these devices should be used in conjunction with 42 inch tall channelizer cones. Caution tape and safety fencing will be inspected and maintained in good, secure condition at all times when used on the project.

5.8 Vehicle Requirements


Each ARCADIS operated vehicle operated in a private roadway work zone should be equipped with high intensity rotating, flashing, oscillating, or strobe lights. If the supplementary lighting is present, the lighting will be maintained in operational condition at all times. Standard vehicle flashers will be when used if other suggested lighting is not available.

6. Training

Each employee having a responsibility to implement any aspect of the STAR Plan will be trained to the level appropriate to perform the required duty. The minimum training requirement includes review of any applicable DOT Fact Sheet(s) relevant to the work being performed and/or other applicable work standard.

7. Reference Documents

- [Manual on Uniform Traffic Control Devices](#), US Department of Transportation, Federal Highway Administration, current edition.
- [ARC DOT-301](#), "Roadway Work Zone Safety, Traffic Control and Employee Safety on Public Roadways."

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- [ARCADIS STAR Plan Template for Private Roadways and Parking Areas](#)
- ARCADIS DOT Facts [300 series](#) fact sheets

8. Records

STAR Plans, including any attached documents, will be retained with the project specific HASP in the project files. The STAR Plan and associated documents may be kept in hard copy or electronic formats. File retention for STAR Plans and associated documents will be consistent with ARCADIS requirements for document retention.

9. APPROVALS AND HISTORY OF CHANGE

Approved By: Sam Moyers, DOT Compliance Manager, ARCADIS




Approved By: Mike Thomas, H&S Director for Environment Division



History of Change

Revision Date	Revision Number	Reason for change
October 30, 2009	DRAFT	Original draft document
November 4, 2009	DRAFT	Revised draft
January 4, 2010	1	Final document

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1. POLICY

It is the policy of ARCADIS that work done in or adjacent to roadways or areas of vehicular traffic be done so to protect employees from the hazards of moving traffic. In addition, ARCADIS complies with US Department of Transportation (USDOT), Federal Highway Administration (FHWA) and applicable State and local government agency requirements associated with traffic and safety and traffic control devices.

2. PURPOSE AND SCOPE

2.1 Purpose

This procedure provides guidance to employees on ARCADIS requirements to develop and implement a Traffic Control Plan (TCP) for all roadway work and work performed off the roadway but under the jurisdiction of a DOT agency (cumulatively referred to in this procedure as "Roadway Work Zone" [RWZ]). This procedure also provides guidance on general H&S issues associated with RWZ safety and training requirements.

2.2 Scope

This procedure is specific to ARCADIS work performed in the RWZ. Work zone safety and traffic control on private property is addressed in the ARCADIS H&S Procedure ARC DOT-302, "Traffic Control and Employee Safety on Private Roadways and Parking Areas." Alternate TCPs developed as part of project work or permit requirements may be used in lieu of the requirements of this procedure as long as the alternate requirements are in writing and equivalent worker protection is achieved.


3. DEFINITIONS

Engineering Judgment - The evaluation of available pertinent information and the application of appropriate principles, standards, guidance, and practices as contained in the Manual on Uniform Traffic Control Devices (MUTCD) and other sources, for the purpose of deciding upon the applicability, design, operation, or installation of traffic control devices. Engineering Judgment shall be exercised by a qualified engineer, or by an individual working under the supervision of a qualified engineer, through the application of procedures and criteria established by the engineer.

High Volume Road – Any roadway that is not classified as a Low Volume Road. Roadways of this type require Engineering Judgment employee involvement in the design of RWZ controls.

Low Volume Road –Means:

- A roadway lying outside of built up areas of cities, towns, and communities with a traffic volume of < 400 vehicles (average annual daily traffic [AADT]). Note: for visual reference, generally, any roadway which has a vehicle at ≥ 2 minutes intervals at peak periods (usually 0700-0800 and 1700-1800) is considered a Low Volume Road.
- Is not a freeway, expressway, interchange ramp, freeway service road, or a road on a designated State highway system.

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- The roadway may have paved or unpaved completion.

“Must”, “Shall” and “Will” – Means the requirement is mandatory, even if the condition is permitted by regulation to a less stringent standard. This definition also applies to equivalent terms in DOT Fact Sheets associated with this procedure.

Reasonable Time and Place - A condition where the employee conducting the required task is permitted to perform the task in a rested state, free from any condition that would compel the employee to hurry through the assigned task due to:

- Work schedule,
- Budget, and/or
- Mandate requiring the task be performed during times normally considered by employees to be free of any obligation to perform work on behalf of ARCADIS (vacation, holidays, etc.)

Roadway – That portion of a highway improved, designed, or ordinarily used for vehicular travel and parking lanes, but exclusive of the sidewalk, berm, or shoulder. In the event a highway includes two or more separate roadways, the term roadway refers to any such roadway separately, but not to all such roadways collectively.


“Should” and “May” – Means the requirement is recommended, if the requirement(s) is not in conflict with an applicable regulatory requirement(s). This definition applies to equivalent terms DOT Fact Sheets associated with this procedure.

Temporary Traffic Control Zone – An area of a highway where road user conditions are changed because of a RWZ or incident by the use of temporary traffic control devices, flaggers, uniformed law enforcement officers, or other authorized personnel.

Traffic Control Device – A sign, signal, marking, or other device used to regulate, warn, or guide traffic, placed on, over, or adjacent to a street, highway, pedestrian facility, or shared-use path by authority of a public agency having jurisdiction.

Roadway Work Zone – Any portion of a roadway, shoulder, median, or off the shoulder area under the jurisdiction of a DOT agency with non-rail responsibilities (Federal, State or local) and where ARCADIS performs work. This term also includes sidewalks, berms and road cuts.

Work or Working – Means an ARCADIS employee performing an activity in the interest of ARCADIS (work activities) within a RWZ. The term also includes ARCADIS employees taking rest breaks, eating or drinking within the RWZ in association with work activities. The term does not include crossing a roadway for work that is not performed in the RWZ unless otherwise specified by the project specific HASP, Job Loss Analysis (JLA) or TCP.

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4. RESPONSIBILITIES

4.1 Corporate Health and Safety

Corporate Health and Safety (through the DOT Compliance Manager) has the overall responsibility for the development, revision and maintenance of the ARCADIS DOT Program for Work Zone Safety. The DOT Compliance Manager, working with ARCADIS transportation engineers and other designated employees will provide stewardship, education and auditing of this program to all affected Employees.


4.2 RWZ Program Steward

The Transportation Business Practice will designate a RWZ Program Steward to provide overall guidance and support to Corporate Health and Safety, especially the DOT Compliance Manager, in RWZ issues. The Steward will also aid in indentifying other engineers within ARCADIS to provide Engineering Judgment support for TCPs.

4.3 Managers and Supervisors

Each ARCADIS Manager acting in a Project Manager or Task Manager responsibility, over projects involving RWZ work, will steward the DOT Program for Roadway Work Zone Safety and audit, to the extent necessary, each project team member's compliance with this program. Each affected manager will:

- Ensure financial resources and appropriate time scheduled to adequately construct and implement required TCPs,
- Make employees that are responsible and accountable for implementing any TCP requirements, available at a reasonable time and place, to review the relevant TCP and provide an opportunity for the employees to ask questions regarding the plan's content.
- Hold employees implementing TCP requirements accountable if found in non compliance with the TCP requirements.
- Make employees responsible for the development of TCPs available at a reasonable time and place to obtain any required training mandated by this procedure or by federal or state regulation.

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4.4 Employees

Each Employee having a responsibility to implement any aspect of a TCP will follow the TCP as instructed. Employees have the absolute right to stop work if asked to perform work (either by ARCADIS or the client) in a manner inconsistent with the TCP. If deviations from the TCP are necessary due to site or other conditions, these deviations will be documented and approved by employees with Engineering Judgment before the deviations are implemented.

5. PROCEDURE

5.1 General

All work performed in a Roadway Work Zone will be conducted under a written project-specific TCP. The required content of the TCP is presented in section 5.2 below. Elements of the TCP must be consistent with:

- The ARCADIS DOT Program for Roadway Work Zone Safety;
- Any applicable governmental or client issued permit for working within or adjacent to the roadway;
- The USDOT MUTCD; and/or
- The relevant state and local equivalent to the MUTCD.

All employees working in a RWZ must have protection from traffic hazards beyond the use of personal protective equipment (PPE). This includes any work in a Temporary Traffic Control Zone. Each TCP will address the specific project methods and equipment to be used to address employee protection beyond PPE.

The TCP is considered an extension of the project specific Health and Safety Plan (HASP). An ARCADIS Template TCP for Public Roadways is available on the DOT Team Site and in the HASP section of the Health and Safety Team Site of the APEX. Alternate formats of the TCP are acceptable as long as the format used is written and effective in ensuring worker protection from traffic hazards.


The TCP will be included as an appendix to the HASP for use by employees in the field.

5.2 TCP Requirements


5.2.1 Required TCP Elements

Each project specific TCP will be in writing and will contain the following elements:

- General Project Information
 - Project name;
 - Project number;

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- RWZ starting point;
 - RWZ end point;
 - Duration of RWZ work;
 - Any time restrictions issued by the agency having jurisdiction over the roadway
 - Speed limits and number of lanes on roads where work will be performed.
 - Name of individual responsible for developing the TCP;
 - Name of individual performing an Engineering Judgment of the TCP; and
 - Name of individual responsible for implementing the TCP (“TBD” or similar entry is not permitted). Back up persons may also be provided if they meet the requirements of this procedure.
- Work Description
 - A brief description of the work to be performed, including estimated durations of time the worker will be in the RWZ both cumulatively and at each specific work location, if applicable.
 - Details of any time restrictions will also be provided.
- Traffic Control Layout
 - A pictorial description created by drafting or legibly hand drawn of the layout of the traffic control devices used.
 - Compliance may be achieved by attaching the applicable DOT Facts 300 series fact sheet for **Low Volume Roads** to the TCP; or
 - For **High Volume Roads, pedestrian control or bicycle control**, attach the relevant Typical Application diagram from the MUTCD or relevant diagram or drawing of the layout from the appropriate state or local issued guidance document. To avoid project delays, these scenarios require an individual with Engineering Judgment to participate in the planning and design of the RWZ layout.
- Indication of the traffic control devices to be used on the project, as required and appropriate:
 - Number of warning signs including wording to be used on the signs.
 - Number of cones, barrels, etc.
 - Number of flaggers, etc.
 - Type message signing, including message content, if warranted

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- Work sequence (phasing)
 - Describe the order in which traffic control devices will be deployed and removed from the roadway.
- Approvals
 - Signature and date TCP developer
 - Signature and date of engineer or other person designated as having Engineering Judgment by Corporate H&S and/or the RWZ Program Steward.
- Reviews
 - Signature and of each employee performing work within the RWZ.

5.3 General PPE Requirements

Each employee will wear, at a minimum, a Class II reflective vest meeting ANSI 107-1999 requirements either orange or lime green in color (the latter color is preferred). A Class III reflective vest should be used on roadways with high traffic volume and is required for night work or when working on roadways with posted speed limits greater than or equal to 55 miles per hour (mph).


Other required PPE includes:

- Safety glasses;
- Hard hat;
- Sturdy boot with ankle support (steel toe may be required based on project safety requirements);
- Other high visibility clothing as prescribed by the project specific HASP, JLA, or TCP and; and
- Other PPE required by the project specific HASP, JLA or TCP will also be worn as specified.

5.4 Vehicle Requirements

Each ARCADIS vehicle operated in a RWZ will be equipped with high intensity rotating, flashing, oscillating, or strobe lights. Required lighting will be maintained in operational condition at all times. Standard vehicle flashers when used alone are not acceptable to meet this requirement.

Consideration should be made with regard to the vehicle's intended use and configuration for selection, mounting and type of high intensity lighting used. Vehicles involved with long term use of high intensity lighting should be equipped with energy efficient lighting to reduce the potential for vehicle battery drain.

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6. Training

Each employee having a responsibility to implement any aspect of the TCP will be trained to the level appropriate to perform the required duty. The training will be consistent with any state requirements (like "flagger training"). At a minimum, the training will include review of this procedure and any applicable DOT Fact Sheets to the project work being performed.

In the absence of any client, state or local mandated flagger certification and/or training requirements, employees involved in flagger duties will be trained in the ARCADIS Flagger Training Program every 2 years.

Persons with TCP development and/or Engineering Judgment responsibilities will have training commensurate with all aspects of the traffic control application being utilized.

7. Reference Documents

- [Manual on Uniform Traffic Control Devices](#), US Department of Transportation, Federal Highway Administration, current edition.
- [ARC DOT-302](#), "Roadway Work Zone Safety, Traffic Control and Employee Safety on Private Roadways and Parking Areas."
- [ARCADIS Traffic Control Plan Template for Public Roadways](#)
- ARCADIS DOT Facts [300 series](#) fact sheets

8. Records

TCPs, including any attached documents and permits, will be retained with the project specific HASP in the project files. The TCP and associated documents may be kept in hard copy or electronic formats. File retention for TCPs and associated documents will be consistent with ARCADIS requirements for document retention.


9. APPROVALS AND HISTORY OF CHANGE

Approved By: Sam Moyers, DOT Compliance Manager, ARCADIS




Approved By: Mike Thomas, H&S Director for Environment Division



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History of Change

Revision Date	Revision Number	Reason for change
October 30, 2009	DRAFT	Original draft document
November 4, 2009	DRAFT	Revised draft
November 9, 2009	DRAFT	Final draft
January 4, 2010	1	Final document

	<u>ARCADIS HS Procedure Name</u> Tailgate Health and Safety Meetings	<u>Revision Number</u> 03
<u>Implementation Date</u> 14 September 2009	<u>ARCADIS HS Procedure No.</u> ARC HSGE001	<u>Revision Date</u> 22 February 2010
<u>Author</u> Mike Thomas	Page 1 of 3	<u>Approver</u> Mija Coppola

1. POLICY

It is ARCADIS US policy that ARCADIS staff will participate in tailgate meetings to be held at least once daily on ARCADIS project sites that occur outside of an office environment to ensure that the health and safety issues of the day's activities are understood by all affected parties and that appropriate controls are in place.

2. PURPOSE AND SCOPE

2.1 Purpose

This procedure describes the requirements for implementing an incident- and injury-free workplace by providing guidance on tailgate safety meetings to be performed prior to all projects performed by ARCADIS staff outside of an office-setting or environment.

2.2 Scope

This procedure applies to all non-office related activities performed by ARCADIS or on behalf of ARCADIS. If the site and project is controlled by ARCADIS, tailgate meetings will include the participation of all ARCADIS staff, ARCADIS subcontractors and other involved site personnel as appropriate. If the site is controlled by another party (e.g., a construction site on which ARCADIS is providing a resident engineer or owner's representative), then ARCADIS staff should attend the tailgate meeting held by the controlling party, if one is held. If the tailgate meeting does not address ARCADIS activities or is not deemed adequate, then the ARCADIS staff will hold their own tailgate meeting following this procedure.

If there is only one ARCADIS staff on the site for the day, then the PM and field staff will conduct the tailgate via phone as deemed appropriate.

It is also ARCADIS US policy that more than one tailgate meeting may be held as appropriate for the activities.


3. DEFINITIONS

Definitions applicable to this procedure may be found in ARC HSMS000 – Health and Safety Management System.

4. RESPONSIBILITIES

Field Supervisor – In the scope of this practice, the designated field supervisor will lead or designate an alternative leader to lead the tailgate meeting. In addition, the field supervisor will verify that in the tailgate meeting, the following are clearly established, communicated and reinforced, and that the workforce understands them:

- A process for the transfer of control of work between work groups as appropriate and applicable

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- Specific procedures and policies that will be followed (e.g., Health and Safety Plan (HASP), Job Loss Analysis (JLA), H&S Procedures, Field H&S Handbook, etc.)
- Assignment of other responsibilities based on the site activities and hazards to competent staff

Project and Task Managers – are responsible for ensuring that all appropriate hazard assessments have been completed, that all project requirements have been communicated to the field supervisor and other responsible parties, that competent personnel, based on the activities and hazards, have been assigned to the project, and that all employees including ARCADIS, subcontractors and other site personnel know of their requirement and participation in all tailgate meetings conducted for the project.

Health and Safety Staff and Project Site Safety Officers or Supervisors – assist with the completion of hazard identification and assessments as appropriate for the project. In addition, these staff will assist with determining the proper controls and provide information for the tailgate meetings that is relevant to the site activities and the hazards to be encountered by employees.

Employees – are responsible for actively participating in the tailgate meetings, acknowledging their presence at the tailgate meetings, and participating in hazard assessments for the activities in which they will be involved. Employees are responsible for understanding the hazards of their activities, implementing the controls for the hazards and using Stop Work Authority if they don't understand the hazards, their job tasks, or if they do not feel safe.

5. PROCEDURE

5.1 Tailgate Meetings


Tailgate meetings will be held, at a minimum, at the start of each work day, shift or task change. It may be necessary to hold tailgate meetings at other times based on the site, activities, and personnel on the site. Tailgate meetings are usually conducted by the field supervisor, the site safety officer or both. At times, the Project Manager or Task Manager may lead the tailgate meeting.

Work crews that include a lone worker will hold a tailgate meeting by telephone with the Project or Task manager as appropriate. The lone worker or small workgroup will call in at the end of the day to complete the tailgate meeting form per this procedure.

Tailgate meetings will review the planned work activities for the work period, discuss and resolve the risks and mitigations, discuss any health, safety, security and environment concerns and raise the consciousness of each worker before they start work. Utilizing the Tailgate Meeting form in Exhibit 1 will ensure that relevant topics are addressed.

5.2 Tailgate H&S Meeting Form

The *Tailgate H&S Meeting Form* (Exhibit 1) will be used to document the conduct of the tailgate H&S meeting. Copies of the completed form will be kept in the project files. It will be

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completed by the designated leader of the meeting during the completion of the meeting and for post day activities review as indicated on the form.

5.3 Participation and Preparation

Effective tailgate meetings require participation. When selecting the location of the meetings, the meeting leader will ensure it is in a place free from distraction and that allows for interaction and participant comfort. This will help encourage participation.

6. TRAINING

No specific training or competence is required related to the conduct of the Tailgate Meeting.

7. REFERENCES

ARCADIS Health and Safety Plan procedure – ARC HSFS010

8. RECORDS

Tailgate Meeting forms to be kept on-site and then in project files per ARCADIS project recordkeeping requirements

9. APPROVALS AND HISTORY OF CHANGE

Approved By: Mija Coppola, Director of H&S



History of Change

Revision Date	Revision Number	Reason for change
14 September 2009	01	Original document
1 February 2010	02	Made minor edits to text. Also, made modifications to Tailgate Meeting form. Changed JSA to JLA.
22 February 2010	03	Added tagline to the Tailgate meeting form



 Infrastructure, environment, buildings	<u>ARCADIS HS Procedure Name</u> Tailgate Meetings	<u>Revision Number</u> 03
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Exhibit 1 –Tailgate Meeting form




Document Control Number:TGM - _____
TGM + project number plus date as follows: xxxxxxxx.xxxx.xxxx - dd/mm/year

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			
T hink 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			<input type="checkbox"/> If there are none, write "None" here: _____
If yes, describe them here: _____			
How will they be controlled? _____			
Prework Authorization - check activities to be conducted that require permit issuance or completion of a checklist or similar before work begins:			
<input type="checkbox"/> Not applicable	<u>Doc #</u> _____	<input type="checkbox"/> Working at Height	<u>Doc #</u> _____
<input type="checkbox"/> Energy Isolation (LOTO)	_____	<input type="checkbox"/> Excavation/Trenching	_____
<input type="checkbox"/> Mechanical Lifting Ops	_____	<input type="checkbox"/> Overhead & Buried Utilities	_____
		<input type="checkbox"/> Confined Space	_____
		<input type="checkbox"/> Hot Work	_____
		<input type="checkbox"/> Other permit	_____
Discuss following questions (for some review previous day's post activities). Check if yes :			<input type="checkbox"/> Topics from Corp H&S to cover?
<input type="checkbox"/> Incidents from day before to review?	<input type="checkbox"/> Lessons learned from the day before?	<input type="checkbox"/> Any Stop Work Interventions yesterday?	
<input type="checkbox"/> Any corrective actions from yesterday?	<input type="checkbox"/> Will any work deviate from plan?	<input type="checkbox"/> If deviations, notify PM & client	
<input type="checkbox"/> JLAS or procedures are available?	<input type="checkbox"/> Field teams to "dirty" JLAS, as needed?	<input type="checkbox"/> All equipment checked & OK?	
<input type="checkbox"/> Staff has appropriate PPE?	<input type="checkbox"/> Staff knows Emergency Plan (EAP)?	<input type="checkbox"/> Staff knows gathering points?	
Comments: _____			
R ecognize the hazards (check all those that are discussed) (Examples are provided) and A ssess 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			

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<u>Author</u> Mike Thomas	Page E2 of E2	<u>Approver</u> Mija Coppola

TAILGATE HEALTH & SAFETY MEETING FORM - Pg. 2																																						
Control the hazards (Check all and discuss those methods to control the hazards that will be implemented for the day): Review the HASP, applicable JLAs, and other control processes. Discuss and document any additional control processes.																																						
<input checked="" type="checkbox"/> STOP WORK AUTHORITY (Must be addressed in every Tailgate meeting - (See statements below))																																						
<input type="checkbox"/> Elimination <input type="checkbox"/> Engineering controls <input type="checkbox"/> General PPE Usage <input type="checkbox"/> Personal Hygiene <input type="checkbox"/> Emergency Action Plan (EAP) <input type="checkbox"/> JLA to be developed/used (<i>specify</i>)	<input type="checkbox"/> Substitution <input type="checkbox"/> Administrative controls <input type="checkbox"/> Hearing Conservation <input type="checkbox"/> Exposure Guidelines <input type="checkbox"/> Fall Protection <input type="checkbox"/> LPO conducted (<i>specify job/JLA</i>)	<input type="checkbox"/> Isolation <input type="checkbox"/> Monitoring <input type="checkbox"/> Respiratory Protection <input type="checkbox"/> Decon Procedures <input type="checkbox"/> Work Zones/Site Control <input type="checkbox"/> Traffic Control <input type="checkbox"/> Other (<i>specify</i>)																																				
Signature and Certification Section - Site Staff and Visitors																																						
<table border="1"> <thead> <tr> <th>Name/Company/Signature</th> <th>Initial & Sign In Time</th> <th>Initial & Sign out Time</th> <th>I have read and understand the HASP</th> </tr> </thead> <tbody> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> <tr><td> </td><td> </td><td> </td><td> </td></tr> </tbody> </table>		Name/Company/Signature	Initial & Sign In Time	Initial & Sign out Time	I have read and understand the HASP																																	
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Post Daily Activities Review - Review at end of day or before next day's work (Check those applicable and explain:)																																						
<input type="checkbox"/> Lessons learned and best practices learned today: _____ <input type="checkbox"/> Incidents that occurred today: _____ <input type="checkbox"/> Any Stop Work interventions today? _____ <input type="checkbox"/> Corrective/Preventive Actions needed for future work: _____ <input type="checkbox"/> Any other H&S issues: _____																																						
Keep H&S 1st in all things		WorkCare - 1.800.455.6155 Near Loss Hotline - 1.866.242.4304																																				

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1. POLICY

It is the practice of ARCADIS and its affiliated companies to implement appropriate, reasonable and practical procedures within acceptable and customary industry practices to promote the health and safety of its employees, and avoid and mitigate exposure of risk in the performance of their work. In furtherance of this policy, ARCADIS promotes and encourages compliance by all employees with this policy and procedures relating to subsurface work and/or investigations (SWI) and working in the vicinity of above ground utilities.

- This procedure is followed by all responsible ARCADIS personnel. Such procedures are included in the project planning processes utilized by ARCADIS personnel.
- Project management procedural requirements are outlined in Section 5.2. All employees included in SWI and above ground utility work are familiar with these procedures.
- The policy of ARCADIS encourages and empowers all employees to take such action as they deem appropriate to assure compliance with this policy and procedures both in project planning and field site operations. Such authority is delegated to those on the project site to immediately stop any SWI work or work in the vicinity of above ground utilities where the employee believes that injury to persons or damage to property could occur. Such action is taken without regard to costs or schedule. Personnel should immediately notify their supervisor of any concerns they have when observing any SWI work or work in the vicinity of above ground utilities. In all agreements between ARCADIS and SWI subcontractors, (e.g., drilling subcontractors), provisions shall be included in the subcontract, work authorization or purchase order.

All ARCADIS personnel involved in SWI work or work in the vicinity of above ground utilities will be appropriately trained on this procedure and have the appropriate professional experience for oversight of or involvement in SWI work or work in the vicinity of above ground utilities. ARCADIS Corporate Health & Safety can answer further questions about this policy or the hazards associated with and the control procedure for work in the vicinity of subsurface or above ground utilities.

Again, to support the efforts of ensuring the health and safety of its employees and mitigating risk to ARCADIS, ARCADIS requires that these policies and procedures be followed and implemented at all levels of project management and field implementation.

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2. PURPOSE AND SCOPE

2.1 Purpose

This procedure directs general safety procedures associated with the identification and management of above ground and subsurface utility locations on project sites.

2.2 Scope

2.2.1 **Management Requirements** - ARCADIS personnel managing or working on any project requiring SWI and requiring work in the vicinity of above ground utilities must incorporate this procedure into their project planning and field work activities to ensure that all reasonable means to identify utilities are implemented and that appropriate controls have been put in place to minimize or eliminate damage to these utilities and the hazards associated with these utilities. All applicable procedures described in this document must be completed prior to initiating intrusive field work or field work in the vicinity of above ground utilities, or the work cannot proceed.

2.2.2 **Project Management Requirements** - Where SWI are required to be performed by a subcontractor to ARCADIS under its subcontract, project management shall require the subcontractor to adequately incorporate SWI procedures described herein into the subcontractor's scope of work.

3. DEFINITIONS


Above Ground Utilities - For the purpose of this procedure, above ground utilities include, but are not limited to: any above ground line, system, or facility used for producing, storing, conveying, transmitting or distributing communication or telecommunications, electricity, gas, petroleum and petroleum products, coal slurry, hazardous liquids or gases, water under pressure, steam, or other hazardous materials.

Subsurface Utilities - For the purposes of this procedure, subsurface utilities include, but are not limited to: any underground line, system, or facility used for producing, storing, conveying, transmitting or distributing communication or telecommunications, electricity, gas, petroleum and petroleum products, coal slurry, hazardous liquids or gases, water under pressure, steam, or sanitary sewage; underground storage tanks; tunnels and cisterns; and septic tanks.

4. RESPONSIBILITIES

4.1 Project Manager Responsibilities

To prevent injury to employees, avoid disruption to utility services, and help eliminate damage to subsurface and above ground utilities, project managers have the responsibility for utility identification, location, and marking prior to initiating field activities. Most states, provinces, municipalities, and clients have rules, general statutes, or laws that specify the requirements of subsurface utility location prior to intrusive subsurface field activities (i.e., excavation, trenching, boring, and all forms of drilling operations, etc.). The project manager ensures that these laws are followed, and that the directives outlined in this procedure are met for every project involving SWI and work in the vicinity of above ground utilities.

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In addition, if field activities are completed in the vicinity of above ground utilities, the project manager is responsible for working with the client to identify the nature of the utilities, and to determine what control processes need to be implemented to prevent damage to these utilities and to minimize any injury in the event there is damage.

4.2 Field Personnel Responsibilities

Field personnel conducting SWI activities and activities where above ground utilities are in the vicinity of the work have the responsibility to read, understand, and follow this procedure and complete the appropriate checklists during the on-site utility locate process. ARCADIS personnel assisting in the identification of underground utilities need to have previous related experience of a minimum of 1 year. Those implementing remote sensing technologies must complete training in those techniques and have 6 months experience operating and interpreting results.

If utilities cannot be located to eliminate any reasonable concern, field personnel can use their Stop Work authority until utility locations can be identified. Field personnel must review this procedure onsite with ARCADIS subcontractors, and ensure they follow the procedures detailed in this document. Any ARCADIS subcontractor not following these procedures will be asked to stop work, and the project manager contacted. Any diversion from this procedure by ARCADIS field personnel must be approved by the project manager with input from Corporate Health & Safety as necessary.

5. PROCEDURE

A flow chart/decision tree of the procedure is presented in Exhibit 1 of this document.


5.1 Lines of Evidence

The following three actions (lines of evidence) are required for the utility location process:

- Contact the State One Call
- Obtain a detailed site utility plan drawn to scale, preferably an “as-built” plan
- Conduct a detailed visual site inspection

In the event that one or more of the above lines of evidence cannot be conducted, or if the accuracy of utility location is questionable, a minimum of one additional line of evidence must be utilized as appropriate or suitable to the conditions. Examples of additional lines of evidence include but are not limited to:

- Private utility locating service
- Research of state, county or municipal utility records and maps including computer-drawn maps or geographical information systems (GIS)
- Contact with the utility provider to obtain their utility location records
- Hand augering or digging
- Hydro-knife

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- Air-knife
- Radio Frequency Detector (RFD)
- Ground Penetrating Radar (GPR)
- Any other method that may give ample evidence of the presence or location of subgrade utilities

5.2 Project Management Procedural Requirements

Field activities are planned and designed to avoid contact with and damage to, and minimize interference with subsurface and above ground utilities in the vicinity of ARCADIS work activities. During the planning phase of a project the project manager will insure the appropriate allocation of utility location responsibilities and verify their completion. The utility location activities will implement the lines of evidence as defined in Section 5.1.


5.2.1 Communication and Coordination

The PM or their designated Task Manager:

- Communicates verbally and in writing the responsibilities for utility location with each party
- Provides the list to the site safety officer for inclusion in the site-specific health and safety plan (HASP);
- Communicates potential hazards to field staff prior to mobilization;
- Instructs field staff to be aware of and implement the procedures in the Section 5.1 of this procedure and utilize the appropriate utility location checklists.
- When practical, schedules a joint meeting between the public/private utility locators and field staff to oversee the subsurface utility locating and marking in the field.
- Communicates with and provides utility location documentation to the subcontractors to verify with them the utility locations and discusses methods to be used to protect those utilities.
- Understands the subcontractor's methods for utility location and documenting the process with a clear delineation of responsibilities for utility location.

In general, subsurface utility locations marked by public utility locators are only good for 2 weeks (research your state-specific requirements). If SWI activities are not conducted during this time period, the site is remarked.

NOTE: At no time is SWI conducted based on old markings, hand-drawn maps/sketches, photographs, or by recollection/memory of field staff. If markings are smeared, removed, damaged, or impacted in any way, the site must be remarked before SWI begins. Flag markings are used in addition to paint markings wherever possible.

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5.2.2 Utility Request Notifications for Public Property


Prior to intrusive work on public property (i.e., right-of-ways, easements, etc.), notification of a public one-call service center is completed a minimum of 48-72 hours (states/localities requirements vary, so the PM is responsible for verifying this) prior to initiating field activities (excluding Saturdays, Sundays, and legal holidays). Specific state or local laws related to utility location are evaluated with respect to notification and liability in the event of utility damage. During the call, the responsible party:

- Provides accurate description of the location of all areas of the SWI;
- Documents the utility locate request to record the time and date of the call, the area to be marked, the list of utility companies and municipalities that the one call service center will notify;
- Records the associated ticket (or dig) number provided by the one call service center;
- Cross references the notification list provided by the one-call service center with the list of known or suspected utilities for the property; and
- Provides accurate contact (responsible party name and phone numbers) information for the one call service center so they can subsequently communicate potential questions and/or delays related to the utility location and marking.

After receiving a request, the one-call service center sends requests to participating utility operators who have utilities in the area of the intrusive field activities. Each underground utility operator dispatches their own locators to mark their facilities with paint or flags. The project manager attempts to have field staff present during the marking of the utilities by the locator organization to ensure that the area of the SWI is included in the locating activities. It is important to note:

- Not all utility operators and municipalities participate in one call programs. In some instances, one-call programs provide a list of utility providers that participate, and a list of those that do not. The utility providers that do not participate are contacted individually so that they can mark their own lines, and this call is documented (date of call, person receiving call, date lines will be marked, etc.);
- Public utility locators are usually only required to mark utilities within the public spaces (i.e., right of ways) or at most up to a meter on private property; and
- Knowledge of existing or suspected, but unmarked utilities are documented and communicated to the site safety officer, field staff, and the client prior to implementing field activities.

If a known or suspected subsurface utility does not participate in the state one-call program, and that provider has not been individually contacted prior to the start of SWI, then the field activities are postponed. If these utility providers are contacted and do not provide utility location services, then SWI are not performed until a private utility locating company is contracted and the locating tasks completed.

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5.2.3 Nation-wide Utility Locate Call Number 811

State and local utility notification centers participate in a “Call before you Dig” number for public safety and to protect underground infrastructure. This national number is: **811**. The number is designed to help prevent professional excavators, drillers and homeowners from damaging underground utility lines, or causing an injury or service outage while digging/drilling. For more information about the 811 services, visit www.call811.com

The number 811 is an FCC designated national n-11 number. This quick and efficient one call service will notify the appropriate utilities, who participate in the one call program. **However**, callers must still verify who the one call service contacts, and then determine which utilities may need to be contacted directly (e.g. those utilities not participating in the one call service) by following the requirements outlined in this procedure.

5.3 Field Protocol

At no time do field activities that involve SWI or work in the vicinity of above ground utilities commence without the field staff having knowledge of the location of subsurface and above ground utilities. In addition, as stated above and in general, subsurface utility locations marked by public utility locators are only good for 2 weeks (research your state-specific requirements). If SWI activities are not conducted during this time period, all lines of evidence must be re-verified.


NOTE: At no time is SWI conducted based on old markings, hand-drawn maps/sketches, photographs, or by recollection/memory of field staff. If markings are smeared, removed, damaged, or impacted in any way, the site must be remarked before SWI begins. Flag markings are used in addition to paint markings wherever possible.

5.3.1 SWI and Subsurface Utilities

Prior to the start of intrusive activities, all utilities are located and measures instituted to avoid subsurface utility hazards. No SWI will be conducted within 30 inches of a line marking. If SWI must take place within 30 inches of the line marking, an additional line of evidence must be used that will ensure the avoidance of the line. An additional safety measure can include the use of lockout/tagout to render the utility controlled.

Prior to mobilizing to the site for SWI work, field staff reviews the task details with the project manager or their designated authorized TM. This may include but is not limited to review of boring logs, excavation permits, etc. Any special site or client requirements are also discussed. Prior to initiation of any intrusive activities, the utilities and structures checklist (Exhibit 2) is reviewed and completed. Generally, the following colors apply for different types of utilities/operations:

- Red – Electric;
- Yellow – Natural gas/oil;
- Orange – Communication/cable television;
- Blue – Water;
- Green – Sewer;
- Pink – Temporary survey marking;
- White – Proposed excavation; and
- Purple – Reclaimed water

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In addition, the SWI subcontractor marks (i.e., paint, stakes, etc.) the location of their operations to ensure they fall within the area that has been investigated for utilities.

Once the checklist is completed and all utilities identified, any client/site specific utility location or other utility (subsurface or above ground utilities) protection procedures (i.e. such as hand digging to a specified depth, covering or shielding lines, etc.) is completed at each location where work will be completed. If a known or suspected public subsurface utility has not been marked or the markings are not clear, the state one-call number is contacted to determine if an “emergency” locate can be requested. If so, follow the procedures outlined by the locate service and contact the project manager. If it is a private utility that is not marked, the facility manager and/or the project manager should be contacted.

If unexpected conditions are encountered (refusal, debris, pea gravel, etc.) while completing the intrusive activity, all work is immediately halted. Note that subsurface utilities at many industrial facilities are often placed in conduits or concrete to prevent damage. If a utility or subsurface structure is compromised, the field staff initiates the Emergency Action Plan Guidelines (Exhibit 4); however, more detailed emergency action procedures should be reviewed with the client and documented in the site specific health and safety plan prior to initiating work.


5.3.2 Work in the Vicinity of Above Ground Utilities

If activities take place in the vicinity of an above ground utility, the utility line can be rendered controlled (i.e. through lockout/tagout procedures) or protected from damage (i.e. covering overhead power lines). The following table is used to develop acceptable work distances for work involving machinery with high extensions (backhoes, drilling rig masts, etc.) in the vicinity of overhead power lines:

Power Line Voltage Phase to phase (kV)	Minimum Safe Clearance (feet)
50 or below	10
Above 50 to 200	15
Above 200 to 350	20
Above 350 to 500	25
Above 500 to 750	35
Above 750 to 1,000	45

ANSI Standard B30.5-1994, 5-3.4.5

The distance may be lengthened if directed by the client or the electric company, and any specified distances are strictly followed. In addition, work involving machinery, vehicles or equipment that may come in contact with above ground utilities is not completed until those utilities are protected or control processes are in place to avoid damage to those utilities.

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If an above ground utility is discovered that has not been previously identified prior to mobilizing to the field, the field staff notifies the project manager who requests the client to assist in the identification of the utility and the implementation of control procedures as appropriate. In addition, if a utility or subsurface structure is compromised, the field staff initiates the Emergency Action Plan Guidelines (Exhibit 3); however, more detailed emergency action procedures should be reviewed with the client and documented in the site specific health and safety plan prior to initiating work.

6. TRAINING

Not applicable to this procedure.

7. REFERENCES

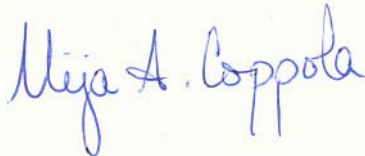
8. RECORDS


8.1 Utilities Location Records

All records (maps and documentation of communications) used to determine the location of utilities should be retained and kept in the project file.

9. APPROVALS AND HISTORY OF CHANGE

Approved By: Mija Coppola, Director H&S, Infrastructure and PM/CM Divisions



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History of Change

Revision Date	Revision Number	Reason for change
13 December 2006	01	Original document
26 March 2007	02	Put in new company format
15 May 2007	03	Added nation-wide 811 number
6 September 2007	04	Changing over to new template format
22 February 2008	05	Changing over to new template format
13 January 2009	06	Define lines of evidence


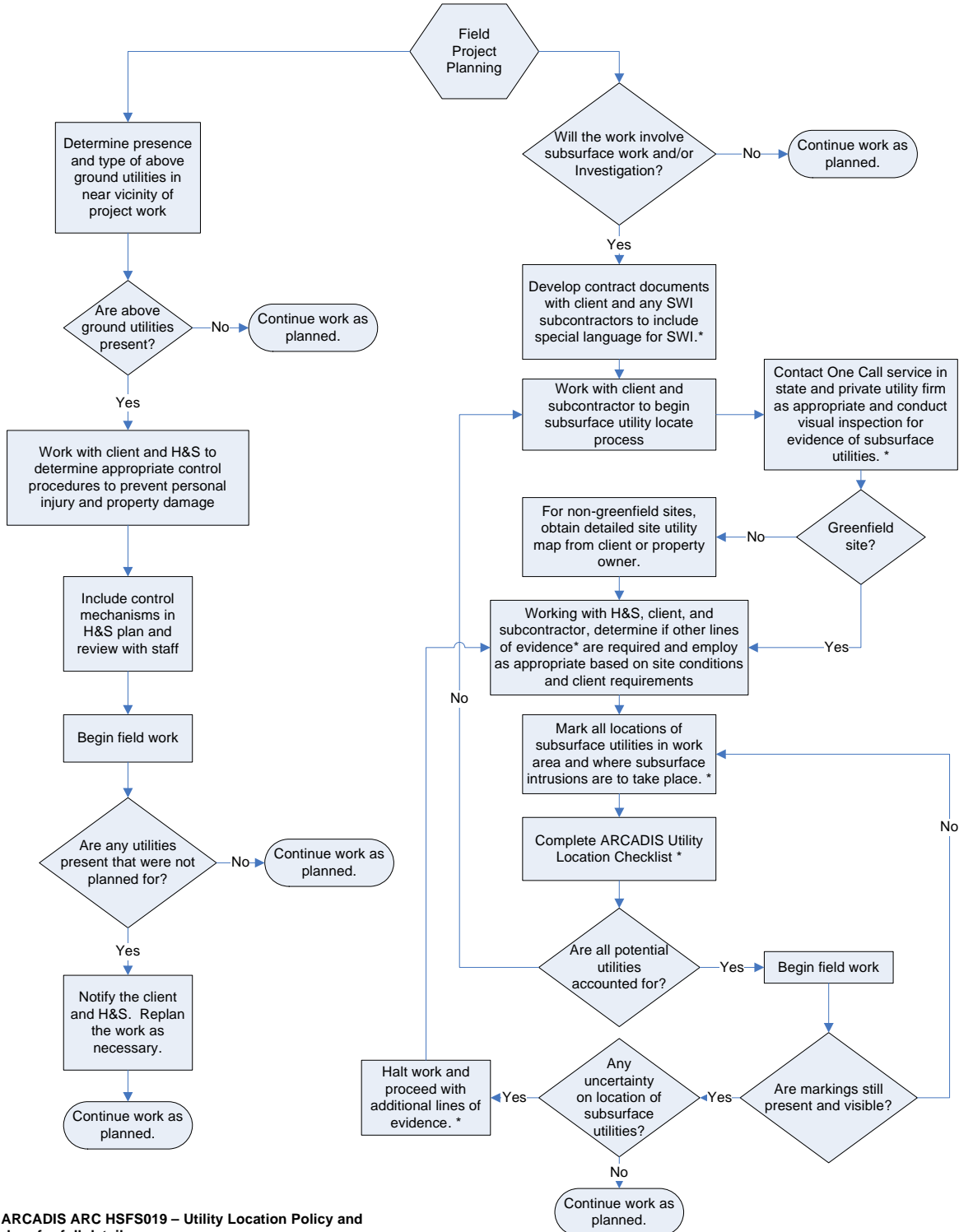
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Exhibit 1 – Utility Location Decision Tree

Exhibit B- Utility Location Decision Tree*
(PMs or TMs are required to follow both sides of flowchart)



* See ARCADIS ARC HSFS019 – Utility Location Policy and Procedure for full details.



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Exhibit 2 - Utilities and Structures Checklist


Project:	Project Number:
Site Location:	Date:

Instructions: This checklist will be used as a safety measure to insure that all underground utility lines, other underground structures as well as above ground utilities are clearly marked out and identified in the area selected for boring or excavation. **DRILLING, EXCAVATION, OR ANY TYPE OF GROUND INTRUSIVE WORK MAY NOT PROCEED UNTIL LINES ARE MARKED AND THIS CHECKLIST HAS BEEN COMPLETED.**

Pre-Field Work Requirements		
Was the state one-call notified with the required advanced notice (usually 48 to 72 hours) (or 811 Nation-wide number)	YES	NO
State one-call confirmation number		
List utility companies who do not participate in the state one call program. Were they contacted directly?		
What additional lines of evidence are used for utility clearance?		
Was a plot plan showing site features and subsurface utilities provided by the PM/TM?	YES	NO
Subgrade Utility Line Location		
Where is the gas line located?		
Where is the gas meter located on the site building(s)?		
Are the electric lines subsurface or overhead? Where are they located?		
Where is electric meter located on the site building(s)?		

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Where are the telephone/cable lines located? Are there any overhead lines?	
Where do these lines enter the site building(s)?	
Where are the water lines located?	
Does the site occupant use water (bathrooms, industrial uses, fire suppression, etc.)? If so where do the water lines enter the building for these purposes?	
Are there small manholes/vault covers indicating water lines? If so, where?	
Was the local municipality contacted to mark sanitary lines?	
Where are the sanitary lines located?	
Where might the sanitary lines enter the building? (i.e. what side of the building are the bathrooms, kitchens, water treatment plant, etc?)	
Where are the storm sewer lines located?	
Are there storm sewer inlets located on the property? Check inlets for direction of subsurface lines.	
Are there any gutters directing storm water to the subsurface? Evaluate for direction of lines.	
Underground Storage Tank Sites	
Where are the USTs located? How many USTs are at the site (very number of USTs by counting fill ports and vent lines)?	
Where do the vent lines run?	
Where does the piping run? (Evaluate the path between USTs to dispenser islands).	
Where are the sub-surface electrical lines located which feed power to the UST system?	
General Underground Utility Location Signs	
Are there any cracks resembling straight lines that may indicate the settling of utility lines?	

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Are there any patched areas where subsurface repairs may have been conducted?	
Are there any manhole covers or valve boxes that are not associated with marked lines?	
Above ground Utility Line Location	
Are there overhead power lines? If, so where are they located?	
What is the voltage of the overhead power lines?	
Are there any above ground structures (utilities, piping, etc.) that are used by the client? If so, are they located proximal to the work area?	
Do these lines need controlled (locked out) or protected prior to starting work?	
Interviews: Site Owners/Occupants MUST be interviewed for location of private utility lines at the site (if practicable) before start of work	
Name of Owner/Occupant.	
How is this person affiliated with the Site?	
Who interviewed Owner/Occupant?	
Date of Interview	
Specific comments that should be noted from the interview:	

NOTE: If any subsurface utilities listed above are not located, do not proceed with subsurface activities. Contact PM/TM immediately.

Name and signature of person who conducted utility line checklist

Name (print)

Signature

Date


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Exhibit 3 - Use and Limitations of Utility Locating Methods

Ground Penetrating Radar (GPR)

The GPR system transmits high frequency electromagnetic waves into the ground and detects the energy reflected back to the surface. Energy is reflected along boundaries that possess different electrical properties. Reflections typically occur at lithologic contacts or where subsurface materials have high electrical contrasts, including metal objects such as underground storage tanks (USTs), drums, and utility pipes. These reflections are detected by the antenna and are processed into an electrical signal that can be used to image the subsurface feature. The GPR data will be reviewed in the field to assist in the delineation of potential piping or other subsurface structures.

The detection of subsurface structures located at the site depends on the electrical properties of the soil and the structure's depth, diameter, and composition. GPR is limited to the detection of smaller diameter pipes with depth. Generally, a pipe must increase in diameter by one 1 inch for each foot in depth to be seen using GPR. Also, plastic piping is more difficult to detect than metal piping using GPR, and caution should be used if plastic utility lines are suspected.


Radio Frequency Detection (RFD)

This instrument operates on the principle of radio frequency transmission and detection. The transmitter applies a known frequency to the pipe and the receiver is able to detect this frequency along the length of the structure. The success of RFD in tracing underground utilities is based on the composition of the structure (metal or plastic) and the ability to accurately position the transmitter unit so that it can be attached to, or placed directly over the structure. RFD should only be used to verify the location of utility mark-outs, and not as the primary method of utility identification.

Soil Vacuum Excavation

This method uses nondestructive vacuum excavation methods to create a visual test hole allowing the confirmation of buried utilities. This method is very accurate and relatively fast and can be performed prior to or during the drilling program. The limiting factors for this method are cost and availability. As with specialty drilling methods, a limited number of firms have the equipment to perform vacuum excavation.

The location of the structures to be cleared relative to the source and depth of impacted soil or groundwater is considered. If the zone to be cleared is known not to contain hazardous vapors or petroleum hydrocarbons via previous testing, continuous air monitoring is implemented using a lower explosive level (LEL)/O₂ meter and photoionization detector (PID) or flame ionization detector (FID) to the depth of the boring. Also consistent with the site health and safety plan (HASp), air monitoring should be conducted continuously with the LEL/O₂ meter during any activity if flammable or explosive vapors are suspected to be present. Prior to any subsurface investigation activities, air monitoring should be conducted to establish background levels for total organic vapors using a PID or FID. All work activity must STOP where tests indicate the concentration of flammable vapors exceeds 10% of the LEL, and the source of vapors must be investigated.

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Vacuum-assisted soil excavation utility clearance will not be used in areas know to contain hazardous vapors or petroleum hydrocarbons unless the equipment to be used is suitable for flammable/explosive atmospheres. There is a significantly increased risk of explosion if these materials are encountered while performing this type of utility clearance. Cautions will be performed, as identified below.

Cautions

Many vacuum systems that are commonly used for utility clearance are considered unsuitable for use for environmental investigation sites. Most vacuum units are "Not for use with Hydrocarbons, Explosives, Corrosive or Toxic Material," and are "Not Intrinsically Safe."

Given that many units and associated tanking are not explosion-proof, the following steps will be considered prior to using vacuum- assisted utility clearance units where soils could be impacted with petroleum hydrocarbons or flammable vapors.

1. Request from the manufacturer and/or the contractor doing the work to supply manufacturers' documentation and specifications for use of the unit at environmental sites.
2. Request documentation that the unit is intrinsically safe and may be used in areas where petroleum hydrocarbon may be present.
3. Obtain the procedures for grounding portable units to discharge potential static electricity during operation.
4. If none of the above are available, then hand auger instead and do not use vacuum-assisted methods.


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Exhibit 4 - Emergency Action Plan Guidelines

When work activities result in the contact or compromise of a utility line, an appropriate response is critical to prevent injury, death or significant property damage. Although circumstances and response vary depending on site specific conditions, the following guidelines provide information that is factored into emergency action planning associated with utility damage. In any event, emergency planning is coordinated with the entity that owns the utility and the client prior to the start of work. This planning and the appropriate response actions are documented in the project health and safety plan and reviewed with all field staff.

Contact with Above or Underground Electric


Contact with above ground or underground electric lines may result in the equipment being energized. Field personnel do not assume rubber tires on equipment are insulating the equipment from the ground. For underground electric strikes, contact with the line may not be immediately noticeable but indications of a strike include: power outage, smoke, explosion, popping noises, or arching electricity. If contact with an electric line is made or is suspected, the following guidelines are followed:

- Under most circumstances, the equipment operator or any worker on a seat of the equipment should stay on the equipment. These workers should not touch anything, especially metal, on the equipment.
- If it is determined that the equipment should be vacated due to a life threatening circumstance, the worker(s) should jump clear as far as possible from the equipment. When jumping keep both feet together and hop away to a safe distance after landing on the ground. Do not use hand holds or touch any part of the equipment when preparing to jump off.
- Workers on the ground should move away from the equipment.
- Keep others away from the equipment and the area.
- If anyone is injured and in contact with the line or equipment, any attempted rescue should be performed with extreme caution. Only use long, dry, clean, unpainted pieces of wood or fiberglass pole or long dry, clean rope to retrieve the victim. Perform first aid/CPR only after the victim is sufficiently clear from the electrical hazard.
- Notify the electric utility or the client as appropriate for the site. Call 911 or the client's emergency response phone number, as appropriate, for any serious injury or any situation that may result in fire or other hazard that could produce injury or property damage.

Natural Gas

If a natural gas line of any size is compromised, immediately:

- Shut off the equipment and remove any other ignition sources.
- Evacuate the area as quickly as possible.
- DO NOT attempt to turn off any gas valves.
- Call 911 or the designated client emergency response number as appropriate.

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- Call the gas utility, if site response is not controlled by the client.
- Do not return to the area until permitted by the utility or by the approved client emergency response personnel, as appropriate.

Water Lines (all types)

Compromised water lines may rapidly become a significant hazard especially if the line is under considerable pressure. Ruptured pressurized water lines may undermine and wash out unconsolidated materials beneath equipment or structures causing them to become unstable. If a pressurized water line is ruptured, the following guidelines should be followed:


- Promptly shut off all equipment.
- Lower masts or other high extension components of the equipment.
- Evacuate area and call the water utility or client emergency response number, as appropriate.
- Turn off the water if the valve location is known and on the site property.
- If potable water lines have been ruptured, attempt to divert any flow away from structures prone to being flooded. Use caution and keep a safe distance from the line break since the ground surface may be compromised.
- For raw process water or other water of unknown quality, do not attempt to divert or contain. Avoid skin contact or accidental ingestion of any water.
- When returning to the area of the break, survey the area for signs of compromised land surface (cracks in asphalt or concrete, depressions in ground, observations of undercutting, etc.) and avoid moving any equipment until these conditions are repaired or resolved.

Sewers (all types)

Use the same general guidelines for water lines when responding to compromised sewers. If a sanitary sewer is compromised additional guidelines should be followed to avoid contracting any bacterial illnesses. These include:

- Promptly evacuate the area.
- Avoid contact with any sewage material.
- If contaminated, promptly wash with soap (antimicrobial) and water and promptly change impacted clothing.
- If sewage is accidentally ingested or infiltrates any breach of the skin or enters the eyes, seek medical attention as a precautionary measure.
- Decontaminate equipment with commercially available disinfectant solutions or a 10% chlorine bleach solution.

Communication Lines

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Contact and compromise of communication lines are generally considered more of a financial concern than a concern associated with injury. However, eye damage may occur if looking into the ends of a cut fiber optic line. Do not look into the ends of fiber optic lines or other communication lines of unknown type. Promptly contact the communication company owning the line.

Product Lines and Underground Storage Tanks (all types)

Compromise of a product line or underground storage tank (UST) requires immediate action to mitigate impact to the environment. For gasoline stations and similar facilities the following guidelines should be followed during a line or UST breach:

- Immediately shut down equipment and turn off the emergency shutoff switch for the facility dispensers.
- If there are no injuries, attempt to contain any flowing product using absorbent materials and/or by physically pumping or bailing product out of the breached area.
- If product is flowing on the surface away from the break area, attempt to protect downgradient storm drains, sewer drains, and surface water features from impact of the petroleum product using any readily available materials.
- If the bottom of a UST has been breached, immediately contact a pump truck to remove product from the affected UST.
- For releases involving diesel fuel, care will be taken to avoid any situation where diesel may be injected into the body from impalement by coated nails, wood splinters, etc. If diesel is injected into the body, seek prompt medical attention, even if no apparent symptoms of a problem exist.
- Clear area and arrange for prompt repair.

For industrial sites with lines or USTs containing multiple products with varying hazards, similar guidelines may be followed as above if the material encountered is known and workers have a fundamental understanding of the hazards associated with the material. Upon discovery of a line or UST breach due to work activities at these sites:

- Immediately stop work and notify the client representative or call the client designated emergency number. For abandoned sites call 911.
- If the material is not known, promptly evacuate the area and let HAZMAT teams deal with the release.

1.0 PURPOSE

IT IS THE POLICY OF ORANGE & ROCKLAND UTILITIES TO COMPLY WITH ALL REGULATIONS PERTAINING TO EXCAVATION AND TRENCHING. The purpose of this procedure is to protect Orange & Rockland Utilities employees from serious **excavation** and **trenching** hazards and to provide specific requirements for the installation of proper cave-in protection.

2.0 APPLICABILITY

This Safety Guideline (SG) applies to all Orange & Rockland Utilities trenching and excavation activities including work performed by Orange & Rockland Contractors. It is recommended that employees consult with the Orange & Rockland *Work Zone Safety Manual* in conjunction with this document.

3.0 INTRODUCTION

Without warning, an unsupported, improperly shored trench or excavation can collapse, potentially trapping, injuring, or killing workers. Vibrations or shocks from vehicles, blasting, trains, pile drivers, heavy trucks, and some tools can contribute to cave-ins by loosening the soil. Excavations in sandy or wet soil or areas that have been backfilled are typically unstable and can cause an excavation or trench to collapse if these unstable conditions are not properly addressed. Loads such as materials, equipment, and people on ground edges around an excavation or trench can significantly increase the pressure on the walls, causing the excavation or trench to collapse. Changing weather conditions affect soils in excavations and trenches. Water from rain and melting snow loosens soil and can increase pressure on **shoring** systems. Excessively dry weather conditions can reduce the cohesiveness of soils.

This SG summarizes requirements for excavating and trenching associated with the operation and maintenance of electric and gas transmission / distribution lines and equipment. The specific requirements that must be met at each site differ depending on the soil classification, the type of work required to be done, and other site-specific considerations.

4.0 COMPLIANCE REQUIREMENTS

A variety of soil types exist and will be encountered during excavation and trenching operations. Classifications for these soils include **stable rock**, and **Type A, B, and C soils**. To simplify the process of identifying the correct control approach you can assume that all excavations and trenches are in Type C soils. To classify soils as other than Type C, a **competent person** must perform a **visual analysis** and a **thumb penetration test**. Individuals performing visual examinations and thumb penetration tests must be trained and qualified and adhere to all the requirements in the definition section of this procedure for soil types.

Excavations of 5 feet or more in depth must be adequately protected by sloping using a horizontal distance of 1.5 feet for every 1-foot increase in depth or using an appropriate shoring system. A competent person, as identified by Orange & Rockland Utilities, must evaluate each excavation or trench regardless of depth and identify the proper control strategy.

4.1 SURFACE ENCUMBRANCES

All trees, boulders, and other **surface encumbrances** that are located so as to create a hazard to employees must be removed or supported, as necessary, to safeguard employees.

4.2 UNDERGROUND INSTALLATIONS

The estimated location of utility installations, such as sewer lines, telephone lines, fuel lines, electric lines, water lines, or any other **underground installations** that reasonably may be expected to be encountered during excavation work, must be determined prior to opening an excavation. During street work, the New York State Code Rule 753, "Protection of Underground Facilities," must be followed. If an excavation is to take place within the boundaries of a Company facility and all underground installations are known, a Code 753 mark out is not required.

4.2.1 Utility Company Notifications

Prior to commencing excavation, utility companies must be contacted and advised of the proposed work, and asked to establish the location of the utility underground installations prior to the start of an excavation. Verbal or written notice must be given at least 2 but no more than 10 working days prior to the commencement date of the proposed excavation. Whenever an excavation date is postponed or canceled, the utility company must be promptly notified. To identify the utility per Code 753 and provide notification, call 811.

Every notice served by an excavator to an operator concerning proposed excavation or demolition work must contain at least the following information:

- The name of the person serving the notice.
- The name, address, and telephone number of the excavator or excavator company.
- The excavator's field number if one is available.
- The name of the field contact person, if any.
- The address and exact location as well as the approximate extent and dimensions of the proposed excavation or demolition area.
- A brief description of the proposed excavation or demolition work.
- The date and time the proposed excavation or demolition work is to commence.

The excavator may proceed with the excavation or demolition work on the stated commencement date if he has received notification from each operator that:

- No underground facility exists in or within 15 feet of the proposed work area
- or**
- Any underground facility located in or within 15 feet of the proposed work area has been staked, marked, or otherwise designated in accordance with provisions of Subpart 753-4 of New York State Industrial Code Rule No. 753.

The excavator must not commence the proposed excavation or demolition work on the stated commencement date if he has been notified by the operator that staking, marking, or other designation of an underground facility located in or within 15 feet of the proposed work area will not be completed on the stated commencement date. In such a case, the operator must notify the excavator of a prompt and practicable date for the completion of the marking. The marking must be within 2 working days after the stated commencement date.

4.2.2 Preservation of Stakes, Markings, or Other Designations

The excavator is responsible for protecting and preserving the staking, marking, or other designation until it is no longer required for proper safe excavation or demolition work at or near the underground utility.

4.2.3 Verification of Underground Facilities

Where any underground facility has been staked, marked, or otherwise designated by the operator within a proposed work area, the excavator must verify the exact type, size, direction of run, and depth of such facility before commencing the excavation.

If the precise location of the facility can not be verified by the excavator after a diligent search at a reasonable depth within the strip of land as staked, marked, or otherwise designated by the operator, the excavator must notify the operator. At that time, the operator must locate the underground facility with his own personnel as soon as possible or must provide prompt field assistance to the excavator.

4.2.4 Powered Excavating Equipment Limitations

After verifying the location of an underground facility, the excavator must not use powered or mechanical excavating equipment closer than 4 inches in any direction from the marked, staked, or otherwise designated or known outside diameter or perimeter of such facility unless it is agreed to in writing by the operator of the affected facility.

4.2.5 Discovery of Unknown Underground Facilities

If an undesignated or otherwise unknown underground facility is discovered within an excavation or demolition work area, the excavator must report such discoveries to the operator if the operator is known or obvious. If the operator is not known or obvious, all utility operators must be notified and they will determine who the owner is within 2 working days. When the owner is identified, the operator shall instruct the excavator on how to proceed.

4.2.6 Reporting Damage to Underground Facilities

Excavators must take all reasonable precautions to prevent damage to underground facilities. Any accidental damage to an underground facility that is knowingly caused by the excavator must be immediately reported to the operator. All excavation work in the immediate area must be suspended until the damaged portion is repaired. The excavator must delay any backfilling in the immediate area of the damaged portion of the underground facility, until the damage has been repaired and the operator advises the excavator that backfilling may proceed. The

operator must perform the repair of underground facilities or others authorized by him, including the excavator.

4.2.7 Discovery of Underground Facilities in Danger of Failing

If an excavator removes surrounding material and as a result an underground facility appears to have failed or is in potential danger of failing from corrosion or other causes, the excavator must immediately notify the operator. The excavator must delay any further work. The excavator may proceed in the area after the operator has advised him that he may do so.

4.2.8 Required Support for Excavated Underground Facilities

An excavator must provide prompt and adequate support for every underground facility located in his work area as he deems necessary or as specified by the operator.

4.2.9 Backfilling Requirements

Prior to backfilling by mechanical means, the excavation must be visually inspected to assure that no personnel are working in the excavation within 25 feet of the backfill area. When backfilling by manual means (i.e. hand shoveling) personnel may remain in the excavation. A second employee must observe the excavation during the backfilling operation to ensure that no one enters the area. Backfilling must be conducted as specified by the operator or in a manner that will avoid damage to, and provide proper support for the underground facility and its protective coating both during and after backfilling. The excavator must avoid placing large rocks, frozen earth, rubble, debris, and any other heavy or sharp material or objects against any underground facility. Backfill beneath and around the facility must be properly compacted in 12" lifts and 6" in and around other facilities. Heavy loads and excessive forces must not be imposed on any exposed underground facility at any time during backfilling operations.

If personnel notice an abnormal appearance of the soil during the backfilling of an excavated area, for example, staining of the soil or an unusual petroleum odor, then the Environmental and Safety Departments must be notified and guidance obtained on handling the material.

4.2.10 Emergency Requirements

In the event of an emergency involving danger to life, health, or property as a result of damage to an underground facility containing gas or liquid petroleum products, the following actions must be taken:

- Evacuate employees and all other endangered personnel from the immediate area.
- Immediately notify the local police and fire departments.
- As soon as possible, notify the operator of the affected facility of the exact location, the nature of the emergency, and the underground facility affected.

4.2.11 Emergency Excavation or Demolition

Excavation or demolition work required to be performed promptly as a result of an emergency or disaster or to correct an immediate hazard may proceed immediately, without prior

notification to operators, provided that the operator is notified as soon as possible that work is commencing or is under way. The excavator must employ extreme caution to prevent damage to existing underground facilities and avoid endangerment of persons and property.

4.3 WALKWAYS AND BRIDGES

Crossing over trenches is prohibited. Where employees or equipment are required or permitted to cross over excavations, walkways or bridges with standard guardrails must be provided. Vehicle crossings must be designed by and installed under the supervision of a **registered professional engineer**. Walkways or bridges must have a clear width of 20 inches and extend a minimum of 24 inches past the surface edge of the trench. Appropriate action(s) must be instituted to address slipping hazards. Walkways and bridges must be constructed with toe boards to keep materials from falling onto workers.

4.4 PLATING OVER EXCAVATIONS

Where operations require open trenches, and pedestrian or vehicle traffic, passageways, or traffic lanes must be maintained, plates must be used.

- Plates must be large enough to span the opening, have a minimum bearing area 1 foot wide on each side of the trench, and be adequate to carry the load.
- Trench walls and adjacent soil must be sufficiently stable for the use of plates.
- The area at the edge of plates must be tapered to provide a smooth riding surface and a safe condition.
- Plates must be fastened or otherwise protected so that they will not move off the openings.
- If the excavation is greater than 3 feet across, and plates are used (as opposed to fencing around the excavation), then the plates must be at least one inch thick.
- For wide trenches or where unstable soil conditions exist, consideration must be given to construction of temporary bridges.

4.5 ENTRY AND EGRESS

A ladder or other safe means of egress must be located in trench excavations that are 4 feet or more in depth so as to require no more than 25 feet of lateral travel for employees. Ladders must be secured and must extend a minimum of 36 inches above the landing.

Excavations and trenches must be adequately protected against unauthorized and/or accidental entry.

4.6 TRAFFIC HAZARDS

The procedures in the Orange & Rockland *Work Zone Safety Manual* must be followed for work area protection. In general, the following procedures must be followed:

- Avoid scheduling street work during hours of unusually heavy traffic.

- Maintain street work areas for only as long as necessary. Move in quickly and safely. Perform the job and move out. Minimize obstruction and accident exposure.
- Provide bridging over excavations where pedestrian and vehicle traffic must be maintained during the job.
- Provide suitable work area devices to make pedestrians and drivers of vehicles aware of work area boundaries.

4.7 FALLING MATERIAL HAZARDS

Employees must be protected from excavated or other materials or equipment that could fall or roll into excavations. Protection must be provided by placing and keeping such materials or equipment at least 2 feet from the edge of excavations, or by the use of retaining devices that are sufficient to prevent materials or equipment from falling into excavations, or by a combination of both if necessary. Large clumps of soil or rock must not be permitted to slide into an excavation/trench.

Employees must be protected from loads or objects falling from lifting or digging equipment. No employee is allowed underneath loads handled by lifting or digging equipment. Employees must stand away from any vehicle being loaded or unloaded. A vehicle operator may remain in the cab of the vehicle being loaded or unloaded when the vehicle is equipped to provide adequate protection for the operator.

4.8 STABILITY OF ADJACENT STRUCTURES

Excavations are not permitted:

- Where the stability of adjoining buildings, walls, or other structures is endangered by excavation operations.
- Where any excavation below the level of the base or footing of any foundation or retaining wall could be reasonably expected to pose a hazard to employees.
- Where sidewalks or pavements, and any attached structures would be undermined.

When concerns exist about the stability of adjacent structures, a registered professional engineer must be consulted to ensure the safety of employees and the stability of the structure.

4.9 WATER ACCUMULATION HAZARDS

Water will erode and soften soil, and must not be allowed to accumulate in an excavation or trench. Employees must not work in excavations in which there is accumulated water, or in which water is accumulating, unless adequate precautions are taken to protect employees against the hazards posed by water accumulation. Workers must leave trenches during rainstorms.

If water is controlled or prevented from accumulating by the use of water removal equipment, a competent person must monitor the equipment to ensure proper operation. Where possible, dikes, sloping of soil or diversion ditches must be used to prevent water from entering the

excavation or trench. If special support or **shield** systems are used to protect personnel, a registered professional engineer must approve them.

4.10 HAZARDOUS ATMOSPHERE TESTING AND CONTROLS

To prevent exposure to harmful levels of atmospheric contaminants and ensure acceptable atmospheric conditions, the following requirements apply:

- Excavations must be tested for oxygen deficiency and other **hazardous atmospheres** before employees enter an excavation greater than 4 feet deep.
- Excavations must be tested for oxygen deficiency and other **hazardous atmospheres** before entry and **continuously during work activities**:
 - When ventilation or other controls are required to maintain an acceptable atmosphere in the excavation.
 - When excavations are in landfill areas
 - When hazardous substances are stored nearby
- Adequate precautions including proper respiratory protection or suitable ventilation must be used to prevent employee exposure to atmospheres containing less than 19.5% oxygen and other hazardous atmospheres.
- Except for qualified gas personnel, employees must not enter or remain in an excavation with a concentration of combustible gas greater than 1% gas.
- Adequate precautions must be used to protect gas personnel from the hazards of unsafe accumulations of vapor or gas, e.g., flammable gases.
- An employee required to conduct atmospheric testing must be trained by a competent person in the use of the test instrument.
- Annual retraining is required for all personnel who conduct atmospheric testing.

The presence of an unsafe atmospheric condition in a trench may indicate that soil contamination has occurred. As indicated in Section 4.2.9, the Environmental & Safety Departments must be notified when soil has an abnormal appearance.

4.11 GENERAL SAFETY CONSIDERATIONS

Personnel must use appropriate personal protective equipment and work practices to ensure their safety on the job, for example, hearing protection when high noise hazards exist and water-resistant boots when water is present on the job site. In addition, power tools must be inspected and operated properly to ensure the safety of personnel. Specifically, electric powered equipment must be connected to ground fault circuit interrupters and attached to a grounded electrical system.

4.12 INSPECTIONS

A competent person must make daily inspections of excavations, the adjacent areas, and the shoring looking for:

- Evidence of a situation that could result in a possible cave-in.
- Indications of failure of the shoring (***braces*** and ***uprights***).
- Hazardous atmospheres.
- Other hazardous conditions.

A competent person must conduct these inspections:

- Prior to the start of work.
- As needed throughout the shift.
- After every rainstorm.
- After any hazard-increasing occurrence.

Where a competent person finds evidence of a hazardous condition that could result in a cave-in, indications of failure of ***protective systems***, hazardous atmospheres, or other hazards, exposed employees must be removed from the hazardous area until the necessary precautions have been taken to ensure their safety.

4.13 SHORING SYSTEMS

Materials used for shoring systems must be free from damage or defects that might impair their proper function. A competent person, considering the following factors, must determine the maximum allowable slope and/or design of all shoring systems:

- Depth of cut.
- Variations of water content.
- Soil type.
- Environmental factors (exposures to air, sun, water, or freezing).
- Vibrations from operating equipment.
- Loads imposed by excavated materials, equipment, etc.

4.13.1 Installation and Removal

The dirt walls in unsupported trenches can slough off, causing dangerous overhangs. The longer a trench is left unsupported, the greater the chances of cave-in. Installation of a shoring system must closely follow the excavation of trenches. Members of shoring systems must be securely connected together to prevent sliding, falling, ***kickouts***, or other predictable failure. Shoring systems must be installed and removed in a manner that protects employees from cave-ins or structural collapses, or from being struck by members of the shoring system.

Before temporary removal of individual members begins, additional precautions must be taken to ensure the safety of employees, such as installing other structural members to carry the loads imposed on the shoring system. Individual members of shoring systems must not be subjected to loads exceeding those that members were designed to withstand.

Removal must begin at, and progress from, the bottom of the excavation. Members must be released slowly so as to note any indication of possible failure of the remaining members of the structure or possible cave-in of the sides of the excavation. Backfilling must progress together with the removal of shoring systems from excavations.

4.13.2 Timber Shoring for Trenches

Timber shoring is a method of protection from cave-ins in trenches. Materials used for shoring must be in good condition, sound, and free from large or loose knots.

4.13.3 Other Protective Systems

The use of these systems must be based on the information provided from a manufacturer's tabulated data, for example, when using an aluminum hydraulic shoring system, or based on the approval of a registered professional engineer.

The manufacturer's provided data must be used when all of the specifications, recommendations, and limitations identified by the manufacturer are addressed and met. Deviations are allowed only if the manufacturer provides specific written approval for the changes. When an approval is provided by the manufacturer, a written copy must be maintained at the job site during all phases of the excavating/trenching activity.

For any situations where construction is performed without the manufacturer's approval or the protective system is designed on-site for the specific project, other tabulated data must be reviewed, including:

- The parameters that affect the selection of a protective system.
- The limits of the use of the data.
- Information for the correct selection of a protective system.

The information or the design must be reviewed and approved by a registered professional engineer. A written copy of the approval must be maintained at the job site during all phases of the excavating/trenching activity.

5.0 DEFINITIONS

Braces: In a shoring system, horizontal members whose ends bear against the uprights or stringers.

Competent Person: Person who is capable of identifying existing and predictable hazards in the surroundings or working conditions which are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate them.

The Competent Person will be the Supervisor, Chief or other lead person on-site at the work location.

Excavation: Any man-made cut, cavity, trench, or depression in an earth surface, formed by earth removal.

Hazardous Atmosphere: An atmosphere that may expose employees to the risk of death, incapacitation, impairment of ability to self-rescue (that is, unaided from an enclosed space), injury, or acute illness from one or more of the following causes:

- Flammable gas, vapor, or mist in excess of 10% of its lower explosive limit (LEL).
- Atmospheric oxygen concentration below 19.5% or above 23.5%.
- Atmospheric concentration of any substance for which a dose or a permissible exposure limit is published in Subpart G, Occupational Health and Environmental Control, or in Subpart Z, Toxic and Hazardous Substances and which could result in employee exposure in excess of its dose or permissible exposure limit.
- Any other atmospheric condition that is ***immediately dangerous to life or health (IDLH)***.

Immediately Dangerous to Life or Health (IDLH): Any condition that poses an immediate or delayed threat to life or that would cause irreversible adverse health effects or that would interfere with an individual's ability to escape unaided from a dangerous atmosphere.

Kickouts: The accidental release or failure of a cross brace.

Maximum Allowable Slope: The greatest angle at which material will lie without sliding (above horizon).

Protective System: A method of protecting employees from cave-ins, from material that could fall from an excavation face, or from the collapse of adjacent structures.

Registered Professional Engineer: A person who is registered as a professional engineer in the state where the work is to be performed.

Shield (Shield System): A structure that is able to withstand the forces imposed on it by a cave-in and thereby protect employees within the structure. Shields can be permanent structures or can be designed to be portable and moved along as work progresses. Additionally, shields can be either pre-manufactured or job-built in accordance with accepted standards. Shields used in trenches are usually referred to as "trench boxes" or "trench shields".

Shoring (Shoring System): A structure such as a timber shoring system that supports the sides of an excavation and that is designed to prevent cave-ins.

Stable Rock: Natural solid mineral matter that can be excavated with vertical sides and remain intact while exposed.

Surface Encumbrances: Include trees, boulders, foundations, streams, water tables, and geological anomalies.

Thumb Penetration Test: A manual analysis that can be used to estimate the unconfined compressive strength of cohesive soils. Type A soils can be readily indented by the thumb, however, they can be penetrated by the thumb only with very great effort. Type C soils can be easily penetrated several inches by the thumb. This test should be conducted on an undisturbed soil sample, such as a large clump of spoil, as soon as practicable after excavation to keep to a minimum the effects of exposure to drying influences. If the excavation is later exposed to wetting influences (rain, flooding), the classification of the soil must be changed accordingly.

Trench (Trench Excavation): A narrow excavation (in relation to its length) made below the surface of the ground. In general, the depth is greater than the width, but the width of a trench is not greater than 15 feet.

Type A Soils: Cohesive soils with an unconfined compressive strength of 1.5 tons per square foot (tsf) (144kPa) or greater. Examples of cohesive soils are: clay, silty clay, sandy clay, clay loam and, in some cases, silty clay loam and sandy clay loam. Cemented soils such as caliche and hardpan are also considered Type A. However, no soil is Type A if:

- The soil is fissured; or
- The soil is subject to vibration from heavy traffic, pile driving, or similar effects; or
- The soil has been previously disturbed; or
- The soil is part of a sloped, layered system where the layers dip into the excavation on a slope of four horizontal to one vertical or greater; or
- The material is subject to other factors that would require it to be classified as a less stable material including seeping water.

Type B Soils: Type B soils are : (1) cohesive soils with an unconfined compressive strength greater than 0.5 tsf (48kPa) but less than 1.5 tsf (144kPa); (2) granular cohesion-less soils including angular gravel (similar to crushed rock), silt loam, sandy loam and, in some cases, silty clay loam and sandy clay loam; (3) previously disturbed soils except those classified as Type C soil; (4) soil that meets the unconfined compressive strength or cementation requirements for Type A, but is fissured or subject to vibration; (5) dry rock that is not stable; or (6) material that is part of a sloped, layered system where the layers dip into the excavation on a slope less steep than four horizontal to one vertical, but only if the material would otherwise be classified as Type B.

Type C Soils: Type C soils are: (1) cohesive soils with an unconfined compressive strength of 0.5 tsf (48kPa) or less; (2) granular soils, such as gravel, sand, and loamy sand; (3) submerged soil or soil from which water is freely seeping; (4) submerged rock that is not stable; and (5) material in a sloped, layered system where the layers dip into the excavation or have a slope of 4 horizontal to 1 vertical or greater.

Underground Installations: Include, but are not limited to, utilities (sewer, telephone, fuel, electric, water, and other product lines), tunnels, shafts, vaults, foundations, and other underground fixtures or equipment that may be encountered during excavation and trenching.

Uprights: The vertical members of a shoring system.

SAFETY GUIDELINE

SG 1026.2

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Visual Analysis: Analysis conducted to determine qualitative information regarding the excavation site in general, the soil adjacent to the excavation, the soil forming the sides of the open excavation and the soil taken as samples from excavated material. At least one visual and one manual analysis is required to classify soil as other than Type C.

6.0 RESPONSIBILITIES

Competent Person: One who is capable of identifying existing and predictable hazards in the surroundings, or working conditions that are unsanitary, hazardous, or dangerous to employees, and who has authorization to take prompt corrective measures to eliminate the hazards. The Competent Person will be the Supervisor, Chief or other lead person on-site at the work location.

Employees: Orange & Rockland personnel responsible for following the requirements of the Excavation and Trenching Safety Guideline, including using the appropriate procedures and attending required training.

Professional Engineer: A person who is registered as a professional engineer in the state where the work is to be performed. However, a professional engineer registered in any state is deemed to be a "registered professional engineer" when approving designs for "manufactured protective systems".

Supervisors: Supervisors are responsible for ensuring that personnel follow the proper procedures.

APPROVAL:  DATE: 12/31/2009
Daniel P. Morales
Manager of Health and Safety

ARCADIS

Appendix F

PPE Checklist

PPE CHECKLIST

R = Equipment required to be present on the site. O = Optional equipment. Subcontractors must have the same equipment listed here as a minimum.

Description (Put Specific Material or Type in Box)	Level Of Protection	
	D	C
Body		
Coveralls	O	
Chemical Protective Suit		R
Splash Apron		
Rain Suit	O	
Traffic Safety Vest (reflective)	R	
Head		
Hard Hat (if does not create other hazard)	R	R
Head Warmer (depends on temperature and weather conditions)	O	O
Eyes & Face		
Safety Glasses (incorporate sun protection as necessary)	R	
Goggles (based on hazard)	O	
Splash Guard (based on hazard)		
Ears		
Ear Plugs	R	R
Ear Muffs	O	O
Hands and Arms		
Outer Chemical Resistant Gloves		R
Inner Chemical Resistant Gloves	R	R
Insulated Gloves	O	
Work Gloves	R	
Foot		
Safety Boots (steel toe and shank)	R	R
Rubber, Chemical Resistant Boots		R (near water)
Rubber Boots	R (near water)	
Disposable Boot Covers	O	R
Respiratory Protection		
1/2 Mask APR		
Full Face APR*		R
Dust Protection		
Powered APR		
SCBA		
Air Line		

*OV/HEPA cartridges are required

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Appendix G

MSDSs

MATERIAL SAFETY DATA SHEET

Identity (as used on label & list)

ACT-22 Cleaner

HAZARD RATINGS

Health 0
 Flammability 0
 Reactivity 0
 Personal Protection A

SECTION I

Manufacturer's Name & Address:

**Aqueous Cleaning Technologies, Inc.
 1380 Brewerton Road
 Syracuse, New York 13208**

Telephone #: (315) 701-0530

Prepared by: J. S. Sacco

Date Prepared: October 9, 2001

SECTION II - HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

Hazardous Components: (chemical identity:common names)	OSHA PEL		ACGIH TLV	Other Limits Recommended	% (optional)
	Cas#	PEL	TLV		
Isopropyl Alcohol	67-63-0				1-2 %

Ingredients include coupling agents, wetting agents ,and other non-hazardous, non-reportable constituents in water.

SECTION III - PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point (deg. F):	212	Specific Gravity (water = 1)	1.001
Vapor Pressure (mm Hg):	ND	Percent, Volatile by Volume (%):	80.0
Vapor Density (air = 1):	ND	Evaporation Rate (Butyl Acetate=1)	ND
Solubility In Water:	Complete	Appearance & Odor:	Light Amber with mild odor.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point (method used):	NA	Flammable Limits:	LEL	UEL
Extinguishing Media:	CO ₂ , Dry Chemical, BC/ABC Extinguisher			
Special Fire Fighting Procedures:	None			
Unusual Fire & Explosion Hazards:	None			

NA = Not Applicable

ND = No Data Available

Modified from OSHA 174

(continued on reverse side)

SECTION V - REACTIVITY DATA

Stability	Unstable	Conditions to Avoid: Extremely High Temperatures
	Stable <input checked="" type="checkbox"/>	
Incompatibility (Materials to Avoid):		Strong Oxidizing Agents
Hazardous Decomposition or Byproducts:		Nitrous Oxides and Ammonial Vapors
Hazardous Polymerization	May Occur <input type="checkbox"/> Will Not Occur <input checked="" type="checkbox"/>	Conditions to Avoid:

SECTION VI - HEALTH HAZARD DATA

Health Hazards (Acute & Chronic):		None	
Carcinogenicity:	NIP? No	IARC Monographs? No	OSHA Regulated?
Signs & Symptoms of Exposure:			
Medical Conditions Generally Aggravated by Exposure:		None	
Emergency First Aid Procedures:			
Ingestion: Dilute with milk or water, induce vomiting and call a physician immediately.			
Inhalation: Move to fresh air.			
Eyes: Immediately flush with water for 15 minutes. Get medical attention.			
Skin: Wash affected area with water and remove contaminated clothing.			

SECTION VII - PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be taken in case material is released or spilled:	
Wipe up or absorb with sand or other absorbent material. Rinse with water.	
Waste Disposal Method:	Material is to be disposed of and handled in accordance with all local, state and federal regulations.
Precautions to be taken in handling and storing:	
Wear chemical resistant gloves and eye protection as good standard procedure.	
Do not let freeze and do not store in areas that exceed 100 deg. F.	
Other Precautions:	

SECTION VIII - CONTROL MEASURE

Respiratory Protection (Specify Type):		None	
Ventilation:	Local Exhaust:	Special:	
	Mechanical: Not Required	Other:	
Protective Gloves:	Recommended as good industrial general practice.		
Eye Protection:	Recommended as good general practice.		
Other Protective Clothing or Equipment:			
Work/Hygenic Practices: As standard good practices, wash thoroughly before handling food and other items that may create an avenue of ingestion.			

ALCONOX MSDS

Section 1 : MANUFACTURER INFORMATION

Product name: Alconox

Supplier: Same as manufacturer.

Manufacturer: Alconox, Inc.
30 Glenn St.
Suite 309
White Plains, NY 10603.

Manufacturer emergency 800-255-3924.

phone number: 813-248-0585 (outside of the United States).

Manufacturer: Alconox, Inc.
30 Glenn St.
Suite 309
White Plains, NY 10603.

Supplier MSDS date: 2005/03/09

D.O.T. Classification: Not regulated.

Section 2 : HAZARDOUS INGREDIENTS

C.A.S.	CONCENTRATION %	Ingredient Name	T.L.V.	LD/50	LC/50
25155-30-0	10-30	SODIUM DODECYLBENZENESULFONATE	NOT AVAILABLE	438 MG/KG RAT ORAL 1330 MG/KG MOUSE ORAL	NOT AVAILABLE
497-19-8	7-13	SODIUM CARBONATE	NOT AVAILABLE	4090 MG/KG RAT ORAL 6600 MG/KG MOUSE ORAL	2300 MG/M3/2H RAT INHALATION 1200 MG/M3/2H MOUSE INHALATION
7722-88-5	10-30	TETRASODIUM PYROPHOSPHATE	5 MG/M3	4000 MG/KG RAT ORAL 2980 MG/KG MOUSE ORAL	NOT AVAILABLE
7758-29-4	10-30	SODIUM PHOSPHATE	NOT AVAILABLE	3120 MG/KG RAT ORAL 3100 MG/KG MOUSE ORAL >4640 MG/KG RABBIT DERMAL	NOT AVAILABLE

Section 2A : ADDITIONAL INGREDIENT INFORMATION

Note: (supplier).
 CAS# 497-19-8: LD50 4020 mg/kg - rat oral.
 CAS# 7758-29-4: LD50 3100 mg/kg - rat oral.

Section 3 : PHYSICAL / CHEMICAL CHARACTERISTICS
--

Physical state: Solid

Appearance & odor: Almost odourless.
White granular powder.

Odor threshold (ppm): Not available.

Vapour pressure (mmHg): Not applicable.

Vapour density (air= 1): Not applicable.

By weight: Not available.

Evaporation rate (butyl acetate = 1): Not applicable.

Boiling point (°C): Not applicable.

Freezing point (°C): Not applicable.

pH: (1% aqueous solution).
9.5

Specific gravity @ 20 °C: (water = 1).
0.85 - 1.10

Solubility in water (%): 100 - > 10% w/w

Coefficient of water\oil dist.: Not available.

VOC: None

Section 4 : FIRE AND EXPLOSION HAZARD DATA

Flammability: Not flammable.

Conditions of flammability: Surrounding fire.

Extinguishing media: Carbon dioxide, dry chemical, foam.
Water
Water fog.

Special procedures: Self-contained breathing apparatus required.
Firefighters should wear the usual protective gear.

Auto-ignition temperature: Not available.

Flash point (°C), method: None

Lower flammability limit (% vol): Not applicable.

Upper flammability limit (% vol): Not applicable.

Not available.

Sensitivity to mechanical impact: Not applicable.

Hazardous combustion products: Oxides of carbon (COx).
Hydrocarbons.

Rate of burning: Not available.

Explosive power: None

Section 5 : REACTIVITY DATA

- Chemical stability:** Stable under normal conditions.
- Conditions of instability:** None known.
- Hazardous polymerization:** Will not occur.
- Incompatible substances:** Strong acids.
Strong oxidizers.
- Hazardous decomposition products:** See hazardous combustion products.

Section 6 : HEALTH HAZARD DATA

- Route of entry:** Skin contact, eye contact, inhalation and ingestion.
- Effects of Acute Exposure**
- Eye contact:** May cause irritation.
- Skin contact:** Prolonged contact may cause irritation.
- Inhalation:** Airborne particles may cause irritation.
- Ingestion:** May cause vomiting and diarrhea.
May cause abdominal pain.
May cause gastric distress.
- Effects of chronic exposure:** Contains an ingredient which may be corrosive.
- LD50 of product, species & route:** > 5000 mg/kg rat oral.
- LC50 of product, species & route:** Not available for mixture, see the ingredients section.
- Exposure limit of material:** Not available for mixture, see the ingredients section.
- Sensitization to product:** Not available.
- Carcinogenic effects:** Not listed as a carcinogen.
- Reproductive effects:** Not available.
- Teratogenicity:** Not available.
- Mutagenicity:** Not available.
- Synergistic materials:** Not available.
- Medical conditions aggravated by exposure:** Not available.
- First Aid**
- Skin contact:** Remove contaminated clothing.
Wash thoroughly with soap and water.
Seek medical attention if irritation persists.
- Eye contact:** Check for and remove contact lenses.
Flush eyes with clear, running water for 15 minutes while holding eyelids open: if irritation persists, consult a physician.
- Inhalation:** Remove victim to fresh air.
Seek medical attention if symptoms persist.
- Ingestion:** Dilute with two glasses of water.
Never give anything by mouth to an unconscious person.
Do not induce vomiting, seek immediate medical attention.

Section 7 : PRECAUTIONS FOR SAFE HANDLING AND USE

Leak/Spill: Contain the spill.
Recover uncontaminated material for re-use.
Wear appropriate protective equipment.
Contaminated material should be swept or shoveled into appropriate waste container for disposal.

Waste disposal: In accordance with municipal, provincial and federal regulations.

Handling procedures and equipment: Protect against physical damage.
Avoid breathing dust.
Wash thoroughly after handling.
Keep out of reach of children.
Avoid contact with skin, eyes and clothing.
Launder contaminated clothing prior to reuse.

Storage requirements: Keep containers closed when not in use.
Store away from strong acids or oxidizers.
Store in a cool, dry and well ventilated area.

Section 8 : CONTROL MEASURES

Precautionary Measures

Gloves/Type:



Neoprene or rubber gloves.

Respiratory/Type:



If exposure limit is exceeded, wear a NIOSH approved respirator.

Eye/Type:



Safety glasses with side-shields.

Footwear/Type: Safety shoes per local regulations.

Clothing/Type: As required to prevent skin contact.

Other/Type: Eye wash facility should be in close proximity.
Emergency shower should be in close proximity.

Ventilation requirements: Local exhaust at points of emission.



Material Safety Data Sheet

1. Product and Company Identification

Product name : **Benzene**

Chemical formula : C₆H₆

Synonyms : Benzol, Cyclohexatriene, Benzole, Phene, Pyrobenzol, Pyrobenzole, Carbon Oil, Coal Tar Naphtha, Phenyl Hydride, Benzolene, Bicarburet of Hydrogen, Coal Naphtha, Motor Benzol, Annulene, (6) Annulene

Company : Specialty Gases of America, Inc
6055 Brent Dr.
Toledo, OH 43611

Telephone : 419-729-7732

Emergency : 800-424-9300

2. Composition/Information on Ingredients

Components	CAS Number	% Volume
Benzene	71-43-2	99+%

3. Hazards Identification

Emergency Overview

Flammable liquid and vapor. Vapor may cause flash fire.
May cause respiratory tract irritation, skin irritation, eye irritation, central nervous system depression, cancer hazard (in humans).

Potential Health Effects

Inhalation : Irritation, ringing in the ears, nausea, vomiting, chest pain, difficulty breathing, irregular heartbeat, headache, drowsiness, symptoms of drunkenness, disorientation, blurred vision, lung congestion, blood disorders, paralysis, convulsion, coma. May cause hearing loss, visual disturbances, reproductive effects, brain damage, cancer in long term exposure.

Eye contact : Irritation.

Skin contact : Irritation, blisters. May cause tingling sensation in long term exposure.

Ingestion : Nausea, vomiting, chest pain, headache, drowsiness, symptoms of drunkenness, disorientation, visual disturbances, lung congestion, paralysis, convulsion, coma. May cause impotence, cancer in long term exposure.

Chronic Health Hazard : Not applicable.

4. First Aid Measures

General advice : None.

Eye contact : Flush eyes with plenty of water for at least 15 minutes. Then get immediate medical attention.

Skin contact : Wash skin with soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention, if needed. Thoroughly

- clean and dry contaminated clothing and shoes before reuse.
- Ingestion : Contact local poison control center or physician immediately. Never make an unconscious person vomit or drink fluids. When vomiting occurs, keep head lower than hips to help prevent aspiration. If person is unconscious, turn head to side. Get medical attention immediately.
- Inhalation : If adverse effects occur, remove to contaminated area. Give artificial respiration if not breathing. If breathing is difficult, oxygen should be administered by qualified personnel. Get immediate medical attention.

5. Fire-Fighting Measures

- Suitable extinguishing media : Carbon dioxide, regular dry chemical, water, regular foam.
Large fires: Use regular foam or flood with fine water spray.
- Specific hazards : Severe fire hazard. Moderate explosion hazard. Vapor/air mixtures are explosive. The vapor is heavier than air. Vapors or gases may ignite at distant ignition sources and flash back. Electrostatic discharges may be generated by flow or agitation resulting in ignition or explosion.
- Fire fighting : Move container from fire area if it can be done without risk. Cool containers with water spray until well after the fire is out. Stay away from the ends of tanks. For fires in cargo or storage area: Cool containers with water from unmanned hose holder or monitor nozzles well after fire is out. If this is impossible, take the following precautions: Keep unnecessary people away, isolate hazard area and deny entry. Let the fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tanks due to fire. For tank, rail car or tank truck: Evacuation radius: 800 meters (1/2 mile). Water may be ineffective.

6. Accidental Release Measures

- Air release : Reduce vapors with water spray. Stay upwind and keep out of low areas.
- Soil release : Dig holding area such as lagoon, pond or pit for containment. Dike for later disposal. Absorb with sand or other non-combustible material.
- Water release : Cover with absorbent sheets, spill-control pads or pillows. Apply detergents, soaps, alcohols or another surface active agent. Collect with absorbent into suitable container. Absorb with activated carbon. Remove trapped material with suction hoses. Collect spilled material using mechanical equipment. Subject to California Safe Drinking Water and Toxic Enforcement Act of 1986 (Proposition 65). Keep out of water supplies and sewers.
- Occupational release : Avoid heat, flames, sparks and other sources of ignition. Stop leak if possible without personal risk. Reduce vapors with water spray. Small spills: Absorb with sand or non-combustible material. Collect spilled material in appropriate container for disposal. Large spills: Dike for later disposal. Remove sources of ignition. Keep unnecessary people away, isolate hazard area and deny entry. Notify Local Emergency Planning Committee and State Emergency Response Committee for release greater than or equal to RQ (U.S. SARA Section 304). If release occurs in the U.S. and is reportable under CERCLA Section 103, notify the National Response Center at (800) 424-8802 (USA) or (202) 426-2675 (USA).

7. Handling and Storage

Handling

Secure cylinder when using to protect from falling. Use suitable hand truck to move cylinders.

Storage

Store in accordance with all current regulations and standards. Subject to storage regulation: U.S. OSHA 29 CFR 1910.106. Grounding and bonding required. Protect from physical damage. Store outside or in a

detached building. Store with flammable liquids. Keep separated from incompatible substances. Keep separated from incompatible substances.

8. Exposure Controls / Personal Protection

Exposure limits

- 1 ppm OSHA TWA
- 5 ppm OSHA STEL 15 minute(s)
- 0.5 ppm OSHA action level
- 10 ppm OSHA TWA (applies to industry exempt from benzene standard 1910.1028)
- 25 ppm OSHA ceiling (applies to industry exempt from benzene standard 1910.1028)
- 50 ppm OSHA peak 10 minute(s) (applies to industry exempt from benzene standard 1910.1028)
- 0.5 ppm ACGIH TWA (skin)
- 2.5 ppm ACGIH STEL (skin)
- 0.1 ppm NIOSH recommended TWA 10 hour(s)
- 1 ppm NIOSH recommended STEL

Engineering measures

Not available.

Personal protective equipment

- | | | |
|--------------------------|---|--|
| Respiratory protection | : | The following respirators and maximum use concentrations are drawn from NIOSH and/or OSHA.
10 ppm – Any air-purifying respirator with a full facepiece and an organic vapor canister.
50 ppm – Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s). Any air-purifying respirator with a full facepiece and a canister providing protection against this substance.
100 ppm – Any powered, air-purifying respirator with a tight-fitting facepiece and organic vapor cartridge(s).
1000 ppm – Any supplied-air respirator with a full facepiece that is pressure-demand or other positive-pressure mode.
For unknown concentrations or immediately dangerous to life or health – Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode. Any supplied-air respirator with full facepiece and operated in pressure-demand or other positive-pressure mode in combination with a separate escape supply.
Escape – Any air-purifying respirator with a full facepiece and an organic vapor canister. Any self-contained breathing apparatus with a full facepiece. |
| Hand protection | : | Wear appropriate chemical resistant gloves. OSHA REGULATED SUBSTANCES: U.S. OSHA 29 CFR 1910.1028. |
| Eye protection | : | Wear splash resistant safety goggles. Provide an emergency eye wash fountain and quick drench shower in the immediate work area. |
| Skin and body protection | : | Wear appropriate chemical resistant clothing. |
| Ventilation | : | Provide local exhaust or process enclosure ventilation system. Ventilation equipment should be explosion-resistant if explosive concentrations of material are present. Ensure compliance with applicable exposure limits. |

9. Physical and Chemical Properties

- | | | |
|------------------|---|----------------------|
| Form | : | Liquid. |
| Color | : | Colorless to yellow. |
| Odor | : | Distinct odor. |
| Molecular weight | : | 78.11 |
| Vapor pressure | : | 75 mmHg @ 20 C |

Vapor density	: 2.8 (air = 1)
Specific gravity	: 0.8765 @ 20 C (water = 1)
Boiling point	: 176 F (80 C)
Freezing point	: 43 F (6 C)
Water solubility	: 0.18% @ 25 C
Solvent solubility	: Soluble: acetone, alcohol, carbon disulfide, acetic acid, carbon tetrachloride, chloroform, ether, oils.
Evaporation rate	: 5.1 (butyl acetate = 1)

10. Stability and Reactivity

Stability	: Stable under normal conditions.
Conditions to avoid	: Avoid heat, flames, sparks and other sources of ignition. Containers may rupture or explode if exposed to heat. Keep out of water supplies and sewers.
Materials to avoid	: Acids, bases, halogens, oxidizing materials, metal salts.
Hazardous decomposition products	: Thermal decomposition products: oxides of carbon.

11. Toxicological Information

Irritation data	: 15 mg/24 hour(s) open skin-rabbit mild; 20 mg/24 hour(s) skin-rabbit moderate; 88 mg eyes-rabbit moderate; 2 mg/24 hour(s) eyes-rabbit severe.
Toxicity data	: 10000 ppm/7 hour(s) inhalation-rat LC50; > 9400 ul/kg skin-rabbit LD50; 1 ml/kg oral-rat LD50.
Carcinogen status	: OSHA: Carcinogen; NTP: Known Human Carcinogen; IARC: Human Sufficient Evidence, Animal Sufficient Evidence, Group 1; ACGIH: A1-Confirmed Human Carcinogen; EC: Category 1.
<u>Acute Health Hazard</u>	
Ingestion	: Moderately toxic.
Inhalation	: Slightly toxic.
Skin	: Highly toxic.

12. Ecological Information

Ecotoxicity Data

Fish Toxicity	: 9200 ug/L 96 hour(s) LC50 (Mortality) Rainbow trout, Donaldson trout (Oncorhynchus mykiss).
Invertebrate Toxicity	: 10000 ug/L 48 hour(s) EC50 (Immortalization) Water flea (Daphnia magna).
Algal Toxicity	: 41000 ug/L 8 hour(s) EC50 (Growth) Green algae (Selenastrum capricornutum).
Other Toxicity	: 25 ug/L 24 day(s) (Residue) Wood frog (Rana sylvatica).

Fate and Transport

Bioconcentration	: 4360 ug/L 24 day(s) BCF (Residue) Northern anchovy (Engraulis mordax) 97 ug/L.
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13. Disposal Considerations

Waste from residues / unused products	: Subject to disposal regulations: U.S. EPA 40 CFR 262. Hazardous Waste Number(s): U019. Hazardous Waste Number(s): D018. Dispose of in accordance with U.S. EPA 40 CFR 262 for concentrations at or above the Regulatory level. Regulatory level – 0.5 mg/L. Dispose in accordance with all applicable regulations.
---------------------------------------	--

Contaminated packaging : Return cylinder to supplier.

14. Transport Information

DOT (US only)

Proper shipping name : Benzene
Class : 3, Packing Group II
UN/ID No. : UN1114
Labeling : Flammable Liquid

Further information

Cylinders should be transported in a secure upright position in a well ventilated truck.

15. Regulatory Information

OSHA Process Safety (29 CFR 1910.119) Hazard Class(es)

Not regulated.

TCSA

Material is listed in TSCA inventory.

SARA Title III Section 302 Extremely Hazardous Substances (40 CFR 355.30)

Not regulated.

SARA Title III Section 304 Extremely Hazardous Substances (40 CFR 355.40)

Not regulated.

SARA Title III SARA Sections 311/312 Hazardous Categories (40 CFR 370.21)

Acute: Yes
Chronic: Yes
Fire: Yes
Reactive: No
Sudden Release: No

SARA Title III Section 313 (40 CFR 372.65)

Benzene

16. Other Information

Prepared by : Specialty Gases of America, Inc.
For additional information, please visit our website at www.americangasgroup.com.

MATERIAL SAFETY DATA SHEET

THE WESTFORD CHEMICAL CORPORATION®

P.O. Box 798

Westford, Massachusetts 01886 USA

Ref. No.: 2001

Date: 1/1/2008

Phone: (978) 392-0866/ (978) 392-0689

Alternate Phone: 1-866-838-3909

Emergency Phone-24 Hours: 1-800-225-3909

Fax: (978) 692-3487 / (978) 496-1108

Web Site: <http://www.biosolve.com>

E-Mail: info@biosolve.com

SECTION I - IDENTITY

Name: BioSolve®
CAS #: 138757-63-8
Formula: Proprietary
Chemical Family: Water Based, Biodegradable, Wetting Agents & Surfactants
HMIS Code: Health 1, Fire 0, Reactivity 0
HMIS Key: 4 = Extreme, 3 = High, 2 = Moderate, 1 = Slight, 0 = Insignificant

SECTION II - HAZARDOUS INGREDIENTS

Massachusetts Right to Know Law or 29 C.F.R. (Code of Federal Regulations) 1910.1000 require listing of hazardous ingredients.

This product does not contain any hazardous ingredients as defined by CERCLA, Massachusetts Right to Know Law and California's Prop. 65.

DOT Class: Not Regulated/Non Hazardous

SECTION III - PHYSICAL - CHEMICAL CHARACTERISTICS

Boiling Point	: 265°F	Specific Gravity	: 1.00 +/- .01
Melting Point	: 32°F	Vapor Pressure mm/Hg	: Not Applicable
Surface Tension- 6% Solution	: 29.1 Dyne/cm at 25°C	Vapor Density Air = 1	: Not Applicable
Reactivity with Water	: No	Viscosity - Concentrate	: 490 Centipoise
Evaporation Rate	: >1 as compared to Water	Viscosity - 6% Solution	: 15 Centipoise
Appearance	: Clear Liquid unless Dyed	Solubility in Water	: Complete
Odor	: Pleasant Fragrance	pH	: 9.1+/- .3
Pounds per Gallon	: 8.38		

SECTION IV - FIRE AND EXPLOSION DATA

Special Fire Fighting Procedures : None
Unusual Fire and Explosion Hazards : None
Solvent for Clean-Up : Water
Flash Point : None
Flammable Limit : None
Auto Ignite Temperature : None
Fire Extinguisher Media : Not Applicable

SECTION V - SPECIAL PRECAUTIONS AND SPILL/LEAK PROCEDURES

Precautions to be taken in Handling and Storage: Use good normal hygiene.

Precautions to be taken in case of Spill or Leak -

Small spills, in an undiluted form, contain. Soak up with absorbent materials.

Large spills, in an undiluted form, dike and contain. Remove with vacuum truck or pump to storage/salvage vessel. Soak up residue with absorbent materials.

Waste Disposal Procedures -

Dispose in an approved disposal area or in a manner which complies with all local, provincial, and federal regulations.

SECTION VI - HEALTH HAZARDS

Threshold Limit Values: Not applicable

Signs and Symptoms of Over Exposure-

Acute : Moderate eye irritation. Skin: Causes redness, edema, drying of skin.

Chronic: Pre-existing skin and eye disorders may be aggravated by contact with this product.

Medical Conditions Generally Aggravated by Exposure: Unknown

Carcinogen: No

Emergency First Aid Procedures -

Eyes: Flush thoroughly with water for 15 minutes. Get medical attention.

Skin: Remove contaminated clothing. Wash exposed areas with soap and water.

Wash clothing before reuse. Get medical attention if irritation develops.

Ingestion: Get medical attention.

Inhalation: None considered necessary.

SECTION VII - SPECIAL PROTECTION INFORMATION

Respiratory Protection	: Not necessary	Local Exhaust Required	: No
Ventilation Required	: Normal	Protective Clothing	: Gloves, safety glasses Wash clothing before reuse.

SECTION VIII - PHYSICAL HAZARDS

Stability	: Stable	Incompatible Substances	: None Known
Polymerization	: No	Hazardous Decomposition Products	: None Known

SECTION IX - TRANSPORT & STORAGE

DOT Class	: Not Regulated/Non Hazardous	Storage	: 35°F-120°F
Freeze Temperature	: 28°F	Shelf Life	: Unlimited Unopened
Freeze Harm	: None (thaw & stir)		

SECTION X - REGULATORY INFORMATION

The Information on this Material Safety Data Sheet reflects the latest information and data that we have on hazards, properties, and handling of this product under the recommended conditions of use. Any use of this product or method of application, which is not described on the Product label or in this Material Safety Data Sheet, is the sole responsibility of the user. This Material Safety Data Sheet was prepared to comply with the OSHA Hazardous Communication Regulation and Massachusetts Right to Know Law.



Material Safety Data Sheet [OSHA 29 CFR 1910.1200]

The QUIKRETE® Companies
One Securities Centre
3490 Piedmont Road, Suite 1300
Atlanta, GA 30329

Emergency Telephone Number
(770) 216-9580

Information Telephone Number
(770) 216-9580

Revision: October 2003

MSDS HH

SECTION I: PRODUCT IDENTIFICATION

<u>QUIKRETE® Product Name</u>	<u>Code #</u>
BLACKTOP PATCH	1701-50
PERMANENT BLACKTOP REPAIR (FORMERLY KNOWN AS COMMERCIAL GRADE BLACKTOP PATCH)	1701-62

SECTION II - HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

Hazardous Components	CAS No.	PEL (OSHA) mg/M ³	TLV (ACGIH) mg/M ³
Crushed Limestone	01317-65-3	5	5
Petroleum Asphalt	8052-42-4	5 (2)	
Silica sand, crystalline (1)	14808-60-7	<u>10</u> %SiO ₂ +2	0.05 (respirable)
May contain one of the following:			
Diesel fuel/Kerosene			100 (3)
Petroleum Distillates (Naphtha)	8030-30-6	100 ppm	100 ppm

(1) Silica is a natural occurring constituent in Limestone. The silica in this product is in a liquid suspension and is not expected to be in a respirable form under normal usage conditions.

(2) In 1997 the ACGH proposed lowering the exposure limit for petroleum asphalt to 0.5 mg/M³.

(3) In 1997 the ACGH proposed an exposure limit of 100 mg/M³. This agency is also proposing to list these materials as category A3 carcinogens. Category A3 carcinogens have been shown to be carcinogenic to animals at relatively high doses of exposure when tested in a manner which is not considered to be relevant to worker exposure.

Other Limits: National Institute for Occupational Safety and Health (NIOSH). Recommended standard maximum permissible concentration=0.05 mg/M³ (respirable free silica) as determined by a full-shift sample up to 10-hour working day, 40-hour work week. See NIOSH Criteria for a Recommended Standard Occupational Exposure to Crystalline Silica.

SECTION III - PHYSICAL/CHEMICAL CHARACTERISTICS

Boiling Point: (1) 105-338 F (40-170 C) _

Vapor Pressure: (1) 10-200 mm Hg @ 68 F (20 C)

Vapor Density: >4

Solubility in Water: Negligible

Appearance and Odor: Black semi-solid material with a hydrocarbon odor

(1) Properties of asphalt binder portion of the product.

Specific Gravity: Approximately 2.25

Melting Point: (1) 100-135 F (38-57 C)

Evaporation Rate: (1) >0.1



Product: Blacktop Patching Products

MSDS HH

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used): 150°F Minimum (Pensky-Martin Closed Cup Method - ASTM D93)**Flammable Limits:** LEL: 0.05 VEL: 5**Extinguishing Media:** Water spray, Dry chemical, Foam or Carbon dioxide. Water or foam may cause frothing.**Special Fire Fighting Procedures:** Self-contained Breathing apparatus required for enclosed areas. Avoid breathing vapors for long periods.**Unusual Fire and Explosion Hazards:** Do not store with strong oxidants. Storage at elevated temperatures may cause release of flammable vapors in open air or explosive vapors in confined spaces. Can cause the creation of carbon monoxide, carbon dioxide, and hydrocarbons.

SECTION V - REACTIVITY DATA

Stability: Stable**Incompatibility (Materials to Avoid):** Strong Oxidizers like liquid oxygen, sodium or calcium hypochlorite**Hazardous Decomposition or Byproducts:** Incomplete combustion can yield carbon monoxide, and oxides of sulfur and nitrogen and various hydrocarbons.**Hazardous Polymerization:** Will not occur

SECTION VI - HEALTH HAZARD DATA

Routes of Entry:	Inhalation?	Yes
	Skin?	Yes
	Ingestion?	Yes

Health Hazard Data:

Carcinogenicity: No association has been established between industrial exposure to petroleum asphalt and cancer in humans. The International Agency for Research on Cancer (IRAC) reviewed the carcinogenic potential of asphalts in monograph 35. They conclude that there was insufficient evidence that undiluted, air-refined asphalt was carcinogenic to animals, while there was only limited evidence that steam-refined asphalts were carcinogenic to animals. Additionally there was insufficient evidence to conclude that asphalts were carcinogenic to human beings. Studies in which mice were exposed to a variety of whole asphalts did not result in any increased cancer rate; mice exposed to asphalts diluted with hydrocarbon solvents had increased incidence of certain types of cancer. Brief or intermittent skin contact with this asphalt product is not expected to produce any delayed effects. While normal handling of this product is not likely to cause cancer in humans, skin contact and breathing of mists, fumes, or vapors should be reduced to a minimum.

Signs and Symptoms of Exposure: Possible effects include headache, nasal, eye, skin and respiratory irritation, nausea; fatigue; drowsiness; pneumonitis; pulmonary edema & central nervous system depression.
Aspiration hazard if ingested.

Medical Conditions Generally Aggravated by Exposure:**Emergency and First Aid Procedure:****Ingestion:** Do not induce vomiting. GET MEDICAL ATTENTION PROMPTLY!**Inhalation:** Move exposed person to fresh air.**Eye Contact:** Flush eyes immediately with water for 15 minutes, occasionally lifting lower and upper lids.**Skin Contact:** Flush with soap and water.

Product: Blacktop Patching Products

MSDS HH

SECTION VII - PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken in Case Material is Released or Spilled: Remove from bodies of water. Shovel into containers for reuse or disposal in accordance with local, state and federal guidelines.

Waste Disposal Method: Recover and recycle as much as possible. Dispose of unusable material via licensed waste disposal Company in accordance with local, state and federal guidelines.

Precautions to be Taken in Handling and Storing: Do not store with strong oxidizers. Store as OSHA Class IIIA Combustible material. Store away from heat and open flames.

Other Precautions: Do not use solvents or abrasive cleaners to wash exposed skin

SECTION VIII - CONTROL MEASURES

Respiratory Protection: NIOSH/MSHA approved hydrocarbon vapor or supplied respiratory protection required in confined spaces

Ventilation: Use out doors or use Local Exhaust with a minimum face velocity of 60 fpm

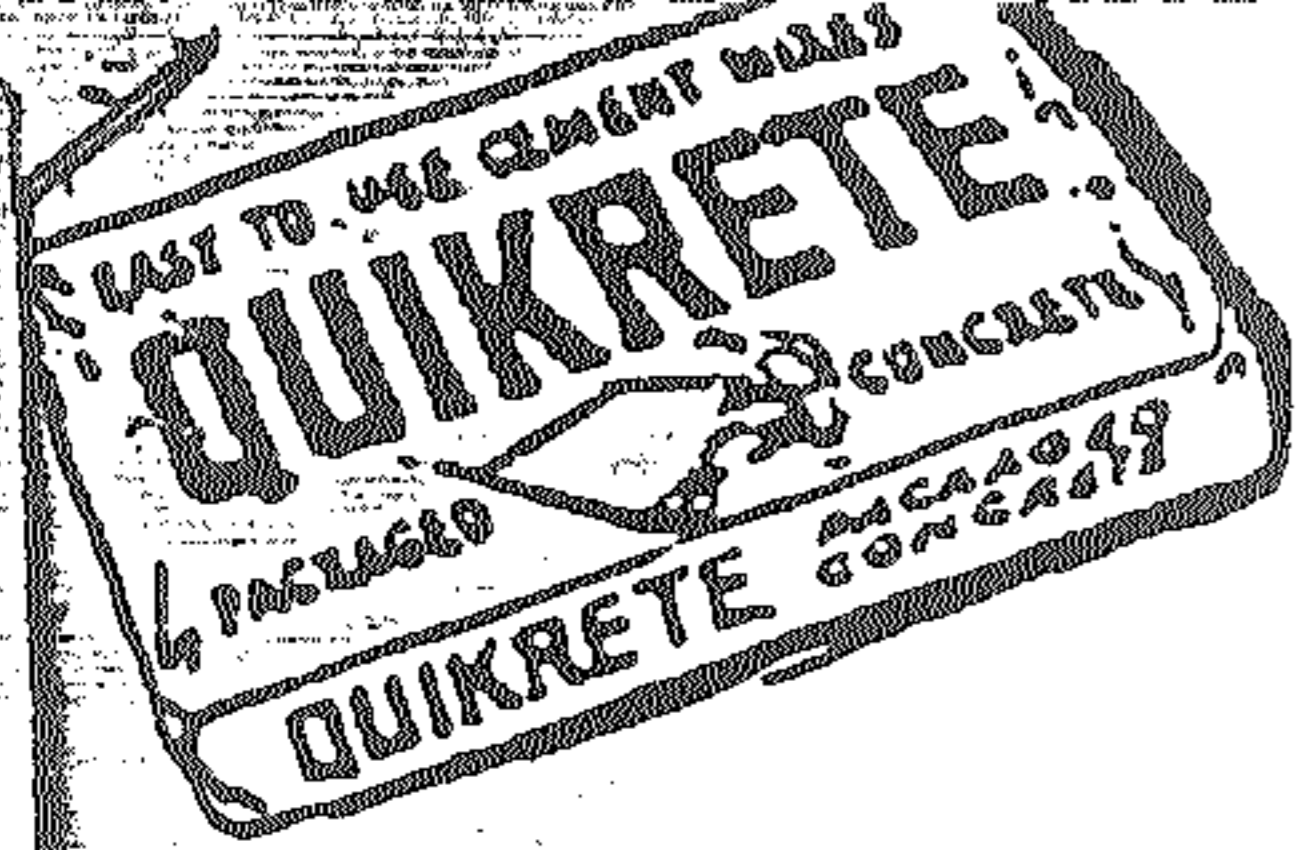
Protective Gloves: Rubber gloves to avoid skin contact.

Eye Protection: Use splash goggles and face shields when eye/face contact may occur.

Other Protective Clothing or Equipment: Long sleeved shirts and cuffless pants to avoid skin contact.

Work/Hygienic Practices: Normal washing with soap and water after handling.

NOTE: The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind, express or implied, is made with respect to the information contained herein.



Material Safety Data Sheet

[OSHA 29 CFR 1910.1200]

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IDENTITY

Product Name: Concrete Mix
Product Code: #1101

SECTION I

Manufacturer's Name and Address

The QUIKRETE Companies
1790 Century Circle
Atlanta, Georgia 30345

Emergency Telephone Number

(404) 634-9100

Information Telephone Number

(404) 634-9100

Date of Preparation

November 19, 1987

SECTION II - HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

<u>Hazardous Components</u>	<u>CAS No.</u>	<u>OSHA PEL</u>	<u>ACGIH TLV 3 MG/M</u>	<u>Other Lim. Recommend</u>
Natural sand, gravel lime-stone or dolomite.	65997-15-1	5	5	
	14808-60-7	0.1	0.1	
		5	5	

SECTION III - PHYSICAL/CHEMICAL CHARACTERISTICS

Solubility in Water - Slight
Gray colored with no odor

The following properties are not applicable: Specific Gravity, Boiling Point, Vapor Pressure, Vapor Density, Melting Point, Evaporation Rate.

Material Safety Data Sheets
QUIKRETE Concrete Mix
#1101

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

Noncombustible and not explosive.

SECTION V - REACTIVITY DATA

Stable.

Is not incompatible with other materials, will not decompose into hazardous products and will not polymerize.

Keep dry until used to preserve product utility.

SECTION VI - HEALTH HAZARD DATA

Classified as a nuisance dust by OSHA, MSHA and ACGIH. As such, the TLV is 5 mg/m³ for respirable dust and 10 mg/m³ for total dust. Not known to cause cancer. Exposure can affect the skin, the eyes and mucous membranes. Sand may become hazardous if particles are broken down to the respiratory size range and if these particles are inhaled. No adverse health effects were seen in animals after ingestion of the materials. The products, as shipped, contain no particles in the respirable size range. However, during shipping, handling, use, the sand particles may be broken down to the respiratory size range that may be inhaled. These dusts are hazardous to the respiratory system because of the presence of free quartz.

Acute Exposure: Can dry the skin and cause alkali burns. Dust can irritate the eyes and upper respiratory system. Toxic effects noted in animals include, for acute exposures, alveolar damage with pulmonary edema. In chronic exposure tests, a fibrosis was noted.

Chronic Exposure: Dust can cause inflammation of the lining tissue of the interior of the nose and inflammation of the cornea. Hypersensitive individuals may develop an allergic dermatitis. Over exposure to inhaled quartz dusts may lead to chronic fibrotic lung disease known as Silicosis, a form of disabling, progressive and sometimes fatal pulmonary fibrosis characterized by the presence of typical nodulations in the lungs. Characteristic X-ray changes are noted. There are no reports of people becoming sensitized to sand. People with pre-existing lung diseases may have increased susceptibility to the health effects of respirable dusts.

Emergency First Aid Procedures: Irrigate (flood) eyes immediately and repeatedly with clean water. Wash exposed skin areas with soap and water. Apply sterile dressings. Get prompt medical attention.

Material Safety Data Sheet
QUIKRETE Cement Mix
#1101

SECTION VII - PRECAUTIONS FOR SAFE HANDLING AND USE

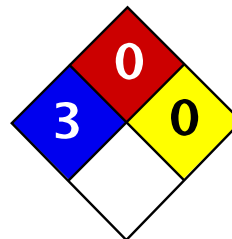
If spilled, can be cleaned up using dry methods that do not disperse dust into the air. Avoid breathing the dust. Emergency procedures are not required.

Can be treated as a common waste for disposal or returned to the container for later use if it is not contaminated or wet.

SECTION VIII - CONTROL MEASURES

In dusty environments, the use of an OSHA, MSHA or NIOSH approved respirator and tight fitting goggles is recommended.

Local exhaust can be used, if necessary, to control airborne dust levels. The use of barrier creams or impervious gloves, boots and clothing to protect the skin from contact is recommended. Following work, workers should shower with soap and water. Precautions must be observed because burns occur with little warning -- little heat is sensed.



Health	3
Fire	1
Reactivity	0
Personal Protection	J

Material Safety Data Sheet Sodium Cyanide MSDS

Section 1: Chemical Product and Company Identification

Product Name: Sodium Cyanide

Catalog Codes: SLS2314, SLS3736

CAS#: 143-33-9

RTECS: VZ7525000

TSCA: TSCA 8(b) inventory: Sodium Cyanide

CI#: Not available.

Synonym:

Chemical Name: Sodium Cyanide

Chemical Formula: NaCN

Contact Information:

Sciencelab.com, Inc.

14025 Smith Rd.

Houston, Texas 77396

US Sales: **1-800-901-7247**

International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:

1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Sodium Cyanide	143-33-9	100

Toxicological Data on Ingredients: Sodium Cyanide: ORAL (LD50): Acute: 6.44 mg/kg [Rat]. DERMAL (LD50): Acute: 10.4 mg/kg [Rabbit].

Section 3: Hazards Identification

Potential Acute Health Effects:

Very hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. Hazardous in case of skin contact (permeator). Corrosive to eyes and skin. The amount of tissue damage depends on length of contact. Eye contact can result in corneal damage or blindness. Skin contact can produce inflammation and blistering. Inhalation of dust will produce irritation to gastro-intestinal or respiratory tract, characterized by burning, sneezing and coughing. Severe over-exposure can produce lung damage, choking, unconsciousness or death. Inflammation of the eye is characterized by redness, watering, and itching. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: Not available.

MUTAGENIC EFFECTS: Not available.

TERATOGENIC EFFECTS: Not available.

DEVELOPMENTAL TOXICITY: Not available.

The substance may be toxic to skin, eyes, central nervous system (CNS). Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure of the eyes to a low level of dust can produce eye irritation. Repeated skin exposure can produce local skin destruction, or dermatitis. Repeated inhalation of dust can produce varying degree of respiratory irritation or lung damage. Repeated exposure to a highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. In case of contact, immediately flush eyes with plenty of water for at least 15 minutes. Cold water may be used. Get medical attention immediately.

Skin Contact:

In case of contact, immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Cover the irritated skin with an emollient. Cold water may be used. Wash clothing before reuse. Thoroughly clean shoes before reuse. Get medical attention immediately.

Serious Skin Contact:

Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation:

If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. **WARNING:** It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:

If swallowed, do not induce vomiting unless directed to do so by medical personnel. Never give anything by mouth to an unconscious person. Loosen tight clothing such as a collar, tie, belt or waistband. Get medical attention immediately.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: May be combustible at high temperature.

Auto-Ignition Temperature: Not available.

Flash Points: Not available.

Flammable Limits: Not available.

Products of Combustion: Some metallic oxides.

Fire Hazards in Presence of Various Substances: Slightly flammable to flammable in presence of acids, of moisture.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available.

Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use water spray, fog or foam. Do not use water jet.

Special Remarks on Fire Hazards:

Dangerous on contact with acids, acid fumes, water or stream. It will produce toxic and flammable vapors of CN-H and sodium oxide.

Contact with acids and acid salts causes immediate formation of toxic and flammable hydrogen cyanide gas. When heated to decomposition it emits toxic fumes hydrogen cyanide and oxides of nitrogen

Special Remarks on Explosion Hazards: Fusion mixtures of metal cyanides with metal chlorates, perchlorated or nitrates causes a violent explosion

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:

Corrosive solid. Poisonous solid.

Stop leak if without risk. Do not get water inside container. Do not touch spilled material. Use water spray to reduce vapors. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up.. Keep container dry. Keep away from heat. Keep away from sources of ignition. Empty containers pose a fire risk, evaporate the residue under a fume hood. Ground all equipment containing material. Do not ingest. Do not breathe dust. Never add water to this product. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids, moisture.

Storage: Keep container tightly closed. Keep container in a cool, well-ventilated area. Do not store above 24°C (75.2°F).

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:

Splash goggles. Synthetic apron. Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Vapor and dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

STEL: 5 (mg/m³) from ACGIH (TLV) [United States] SKIN

CEIL: 4.7 from NIOSH

CEIL: 5 (mg/m³) from NIOSH Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Granular solid. Flakes solid.)

Odor:

Faint almond-like odor.
Odorless when perfectly dry. Emits odor of hydrogen cyanide when damp.

Taste: Not available.

Molecular Weight: 49.01 g/mole

Color: White.

pH (1% soln/water): Not available.

Boiling Point: 1496°C (2724.8°F)

Melting Point: 563°C (1045.4°F)

Critical Temperature: Not available.

Specific Gravity: 1.595 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: Vapor Density of Hydrogen Cyanide gas: 0.941

Volatility: Not available.

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water.

Solubility:

Soluble in cold water.
Slightly soluble in Ethanol

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Excess heat, moisture, incompatibles.

Incompatibility with various substances: Reactive with oxidizing agents, acids, moisture.

Corrosivity:

Corrosive in presence of aluminum.
Non-corrosive in presence of glass.

Special Remarks on Reactivity:

Violent reaction with fluorine gas, magnesium, nitrates, nitric acid.
Dangerous on contact with acids, acid fumes, water or steam. It will produce toxic and flammable vapors of CN-H and sodium oxide.
Cyanide may react with CO₂ in ordinary air to form toxic hydrogen cyanide gas.
Strong oxidizers such as acids, acid salts, chlorates, and nitrates.
Contact with acids and acid salts causes immediate formation of toxic and flammable hydrogen cyanide gas.

Special Remarks on Corrosivity: Corrosive to aluminum

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

Acute oral toxicity (LD50): 6.44 mg/kg [Rat].

Acute dermal toxicity (LD50): 10.4 mg/kg [Rabbit].

Chronic Effects on Humans: May cause damage to the following organs: skin, eyes, central nervous system (CNS).

Other Toxic Effects on Humans:

Very hazardous in case of skin contact (irritant), of ingestion, of inhalation.

Hazardous in case of skin contact (permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: May cause adverse reproductive effects (maternal and paternal fertility) based on animal data.

Special Remarks on other Toxic Effects on Humans:

Acute Potential Health effects:

Skin: May cause itching and irritation. May be fatal if absorbed through injured skin with symptoms similar to those noted for inhalation and ingestion.

Eyes: May cause eye irritation and eye damage.

Inhalation: May cause respiratory tract irritation. May be fatal if inhaled. The substance inhibits cellular respiration causing metabolic asphyxiation. May cause headache, weakness, dizziness, labored breathing, nausea, vomiting. May be followed by cardiovascular effects, unconsciousness, convulsions, coma, and death

Ingestion: May be fatal if swallowed. May cause gastrointestinal tract irritation with nausea, vomiting. May affect behavior and nervous systems (seizures, convulsions, change in motor activity, headache, dizziness, confusion, weakness stupor, anxiety, agitation, tremors), cardiovascular system, respiration (hyperventilation, pulmonary edema, breathing difficulty, respiratory failure), cardiovascular system (palpitations, rapid heart beat, hypertension, hypotension). Massive doses may produce sudden loss of consciousness and prompt death from respiratory arrest.

Smaller but still lethal doses

on the breath or vomitus.

Chronic Potential Health Effects:

Central Nervous system effects (headaches, vertigo, insomnia, memory loss, tremors, fatigue), fatigue, metabolic effects (poor appetite), cardiovascular effects (chest discomfort, palpitations), nerve damage to the eyes, or dermatitis, respiratory tract irritation, eye irritation, or death can occur.

may prolong the illness for 1 or more hours. A bitter almond odor may be noted

Section 12: Ecological Information

Ecotoxicity: Not available.

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are less toxic than the product itself.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14: Transport Information

DOT Classification: CLASS 6.1: Poisonous material.

Identification: : Sodium cyanide UNNA: 1689 PG: I

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:

Connecticut carcinogen reporting list.: Sodium Cyanide
Illinois chemical safety act: Sodium Cyanide
New York release reporting list: Sodium Cyanide
Rhode Island RTK hazardous substances: Sodium Cyanide
Pennsylvania RTK: Sodium Cyanide
Minnesota: Sodium Cyanide
Massachusetts RTK: Sodium Cyanide
Massachusetts spill list: Sodium Cyanide
New Jersey: Sodium Cyanide
New Jersey spill list: Sodium Cyanide
Louisiana RTK reporting list: Sodium Cyanide
Louisiana spill reporting: Sodium Cyanide
California Director's List of Hazardous Substances: Sodium Cyanide
TSCA 8(b) inventory: Sodium Cyanide
TSCA 4(a) final test rules: Sodium Cyanide
TSCA 8(a) PAIR: Sodium Cyanide
TSCA 8(d) H and S data reporting: Sodium Cyanide
TSCA 12(b) one time export: Sodium Cyanide
SARA 302/304/311/312 extremely hazardous substances: Sodium Cyanide
CERCLA: Hazardous substances.: Sodium Cyanide: 10 lbs. (4.536 kg)

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).
EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:**WHMIS (Canada):**

CLASS B-6: Reactive and very flammable material.
CLASS D-1A: Material causing immediate and serious toxic effects (VERY TOXIC).
CLASS E: Corrosive solid.

DSCL (EEC):

R27/28- Very toxic in contact with skin and if swallowed.
R41- Risk of serious damage to eyes.
S1/2- Keep locked up and out of the reach of children.
S26- In case of contact with eyes, rinse immediately with plenty of water and seek medical advice.
S28- After contact with skin, wash immediately

with plenty of water
S36/37- Wear suitable protective clothing and gloves.
S39- Wear eye/face protection.
S45- In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).
S46- If swallowed, seek medical advice immediately and show this container or label.

HMIS (U.S.A.):

Health Hazard: 3

Fire Hazard: 1

Reactivity: 0

Personal Protection: j

National Fire Protection Association (U.S.A.):

Health: 3

Flammability: 0

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves.
Synthetic apron.
Vapor and dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.
Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/11/2005 01:58 PM

Last Updated: 11/06/2008 12:00 PM

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123455-22 DIESEL #2, ON-ROAD (LOW SULFUR)
MATERIAL SAFETY DATA BULLETIN

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: DIESEL #2, ON-ROAD (LOW SULFUR)
SUPPLIER: EXXONMOBIL OIL CORPORATION
3225 GALLOWS RD.
FAIRFAX, VA 22037

24 - Hour Health and Safety Emergency (call collect): 609-737-4411

24 - Hour Transportation Emergency:
CHEMTREC: 800-424-9300 202-483-7616
LUBES AND FUELS: 281-834-3296

Product and Technical Information:
Lubricants and Specialties: 800-662-4525 800-443-9966
Fuels Products: 800-947-9147
MSDS Fax on Demand: 713-613-3661
MSDS Internet Website: <http://www.exxon.com>, <http://www.mobil.com>

2. COMPOSITION/INFORMATION ON INGREDIENTS

CHEMICAL NAMES AND SYNONYMS: HYDROCARBONS AND ADDITIVES

GLOBALLY REPORTABLE MSDS INGREDIENTS:

Substance Name	Approx. Wt%
DIESEL FUEL (68334-30-5)	100

COMPONENT(S) OF PRODUCT INGREDIENTS INCLUDE:

NAPHTHALENE (91-20-3)	0.5
ETHYL BENZENE (100-41-4)	0.5

NOTE: Composition may contain up to 0.5% performance additive.

See Section 8 for exposure limits (if applicable).

3. HAZARDS IDENTIFICATION

This product is considered hazardous according to regulatory guidelines (See Section 15).

EMERGENCY OVERVIEW: Clear (May Be Dyed) Liquid. Material is combustible. Liquid can release vapors that readily form flammable mixtures at or above the flash point. Product can accumulate a static charge which may cause a fire or explosion. DOT ERG No. : 128

POTENTIAL HEALTH EFFECTS: Respiratory irritation, headache, dizziness, nausea, loss of consciousness, and in cases of extreme exposure, possibly death. Diesel exhaust may cause lung cancer. Prolonged, repeated skin contact may result in skin irritation or more serious skin disorders. Low viscosity material-if swallowed may enter the lungs and cause lung damage. Note: This product contains polycyclic aromatic hydrocarbons, some of which have been reported to cause skin cancer in test animals and in humans under conditions of poor personal hygiene and prolonged repeated contact.

POTENTIAL ENVIRONMENTAL EFFECTS: Toxic to aquatic organisms; may cause long-term adverse effects in the aquatic environment.

For further health effects/toxicological data, see Section 11.

4. FIRST AID MEASURES

EYE CONTACT: Flush thoroughly with water. If irritation occurs, call a physician.

SKIN CONTACT: Remove contaminated clothing. Dry wipe exposed skin and cleanse yourself with waterless hand cleaner and follow by washing thoroughly with soap and water. For those providing assistance, avoid further contact to yourself or others. Wear impervious gloves. Launder contaminated clothing separately before reuse. Discard contaminated articles that cannot be laundered. (See Section 16 - Injection Injury)

INHALATION: Remove from further exposure. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with mechanical device or use mouth-to-mouth resuscitation.

INGESTION: Seek immediate medical attention. Do not induce vomiting.

NOTE TO PHYSICIANS: Material if aspirated into the lungs may cause chemical pneumonitis. **PRE-EXISTING MEDICAL CONDITIONS WHICH MAY BE AGGRAVATED BY EXPOSURE:** Hydrocarbon Solvents/Petroleum Hydrocarbons- Skin contact may aggravate an existing dermatitis.

5. FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA: Carbon dioxide, foam, dry chemical and water fog.

SPECIAL FIRE FIGHTING PROCEDURES: Water may be ineffective, but water should be used to keep fire-exposed containers cool. Prevent runoff from fire control or dilution from entering streams,

sewers, or drinking water supply.

SPECIAL PROTECTIVE EQUIPMENT: For fires in enclosed areas, fire fighters must use self-contained breathing apparatus.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Material is combustible. Liquid can release vapors that readily form flammable mixtures at or above the flash point. Product can accumulate a static charge which may cause a fire or explosion.

COMBUSTION PRODUCTS: Fumes, smoke, carbon monoxide, sulfur oxides, aldehydes and other decomposition products, in the case of incomplete combustion.

Flash Point C(F): > 55(131) (ASTM D-93).

Flammable Limits (approx.% vol.in air) - LEL: 0.6%, UEL: 7.0%

NFPA HAZARD ID: Health: 1, Flammability: 2, Reactivity: 0

6. ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES: Report spills/releases as required to appropriate authorities. U.S. Coast Guard and EPA regulations require immediate reporting of spills/releases that could reach any waterway including intermittent dry creeks. Report spill/release to Coast Guard National Response Center toll free number (800)424-8802. In case of accident or road spill notify CHEMTREC (800) 424-9300.

PROCEDURES IF MATERIAL IS RELEASED OR SPILLED:

LAND SPILL: Eliminate sources of ignition. Shut off source taking normal safety precautions. Take measures to minimize the effects on ground water. Recover by pumping using explosion-proof equipment or contain spilled liquid with sand or other suitable absorbent and remove mechanically into containers. If necessary, dispose of adsorbed residues as directed in Section 13.

WATER SPILL: Eliminate sources of ignition and warn other ships in the vicinity to stay clear. Notify port and other relevant authorities. Confine with booms if skimming equipment is available to recover the spill. Otherwise disperse in unconfined waters, if permitted by local authorities and environmental agencies. If permitted by regulatory authorities the use of suitable dispersants should be considered where recommended in local oil spill procedures.

ENVIRONMENTAL PRECAUTIONS: Prevent material from entering sewers, water sources or low lying areas; advise the relevant authorities if it has, or if it contaminates soil/vegetation.

PERSONAL PRECAUTIONS: See Section 8

7. HANDLING AND STORAGE

HANDLING: Keep product away from high energy ignition sources, heat, sparks, pilot lights, static electricity, and open flame. Harmful in contact with or if absorbed through the skin. Avoid inhalation of vapors or mists. Use in well ventilated area away from all ignition sources. See Section 8 for additional personal protection advice when handling this product.

STORAGE: Store in a cool area. Avoid sparking conditions. Ground and bond all transfer equipment.

SPECIAL PRECAUTIONS: To prevent and minimize fire or explosion risk from static accumulation and discharge, effectively bond and/or

ground product transfer system. Do not use electronic devices (including but not limited to cellular phones, computers, calculators, pagers, etc.) in or around any fueling operation or storage area unless the devices are certified intrinsically safe by an approved national testing agency and to the safety standards required by national and/or local laws and regulations. Electrical equipment and fittings must comply with local fire prevention regulations for this class of product. Use the correct grounding procedures. Refer to national or local regulations covering safety at petroleum handling and storage areas for this product.

EMPTY CONTAINER WARNING: Empty containers retain residue (liquid and/or vapor) and can be dangerous. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY OR DEATH. Do not attempt to refill or clean container since residue is difficult to remove. Empty drums should be completely drained, properly bunged and promptly returned to a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations.

 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS:

ExxonMobil recommends an 8-hour time-weighted average (TWA) exposure of 500 mg/m³ total vapor (approx. 100 ppm) or 5 mg/m³ stable aerosols.

Substance Name (CAS-No.)	Source	---TWA---		----STEL---		NOTE
		ppm	mg/m ³	ppm	mg/m ³	
NAPHTHALENE (91-20-3)	OSHA	10	50	15	75	
	ACGIH	10	52	15	79	
ETHYL BENZENE (100-41-4)	OSHA	100	435	125	545	
	ACGIH	100	434	125	543	

NOTE: Limits shown for guidance only. Follow applicable regulations.

VENTILATION: Use in well ventilated area with local exhaust ventilation. Ventilation equipment must be explosion proof. Use away from all ignition sources.

RESPIRATORY PROTECTION: Approved respiratory equipment must be used when airborne concentrations are unknown or exceed the recommended exposure limit. Self-contained breathing apparatus may be required for use in confined or enclosed spaces.

EYE PROTECTION: If splash with liquid is possible, chemical type goggles should be worn.

SKIN PROTECTION: Impervious gloves must be worn. If contact is likely

oil impervious clothing must be worn. Good personal hygiene practices should always be followed.

9. PHYSICAL AND CHEMICAL PROPERTIES

Typical physical properties are given below. Consult Product Data Sheet for specific details.

APPEARANCE: Liquid
COLOR: Clear (May Be Dyed)
ODOR: Hydrocarbon
ODOR THRESHOLD-ppm: NE
pH: NA
BOILING POINT C(F): > 149(300)
MELTING POINT C(F): NA
FLASH POINT C(F): > 55(131) (ASTM D-93)
FLAMMABILITY (solids): NE
AUTO FLAMMABILITY C(F): NE
EXPLOSIVE PROPERTIES: NA
OXIDIZING PROPERTIES: NA
VAPOR PRESSURE-mmHg 20 C: 0.5
VAPOR DENSITY: > 2.0
EVAPORATION RATE: NE
RELATIVE DENSITY, 15/4 C: 0.82-0.87
SOLUBILITY IN WATER: Negligible
PARTITION COEFFICIENT: > 3.5
VISCOSITY AT 40 C, cSt: > 1.0
VISCOSITY AT 100 C, cSt: NE
POUR POINT C(F): < -7(20)
FREEZING POINT C(F): NE
VOLATILE ORGANIC COMPOUND: NE
DMSO EXTRACT, IP-346 (WT.%): NA

NA=NOT APPLICABLE NE=NOT ESTABLISHED D=DECOMPOSES

FOR FURTHER TECHNICAL INFORMATION, CONTACT YOUR MARKETING REPRESENTATIVE

10. STABILITY AND REACTIVITY

STABILITY (THERMAL, LIGHT, ETC.): Stable.
CONDITIONS TO AVOID: Extreme heat and high energy sources of ignition.
INCOMPATIBILITY (MATERIALS TO AVOID): Halogens, strong acids, alkalies, and oxidizers.
HAZARDOUS DECOMPOSITION PRODUCTS: Product does not decompose at ambient temperatures.
HAZARDOUS POLYMERIZATION: Will not occur.

11. TOXICOLOGICAL DATA

---ACUTE TOXICOLOGY---

ORAL TOXICITY (RATS): Practically non-toxic (LD50: greater than 2000 mg/kg). ---Based on testing of similar products and/or the components.
DERMAL TOXICITY (RABBITS): Practically non-toxic (LD50: greater than 2000 mg/kg). ---Based on testing of similar products and/or the

components.

INHALATION TOXICITY (RATS): Practically non-toxic (LC50: greater than 5 mg/l). ---Based on testing of similar products and/or the components.

EYE IRRITATION (RABBITS): Practically non-irritating. (Draize score: greater than 6 but 15 or less). ---Based on testing of similar products and/or the components.

SKIN IRRITATION (RABBITS): Practically non-irritating. (Primary Irritation Index: greater than 0.5 but less than 3). ---Based on testing of similar products and/or the components.

---SUBCHRONIC TOXICOLOGY (SUMMARY)---

Repeated dermal application of middle distillates, heating oils and diesel oils to rabbits for 2-4 weeks at up to 1 gm/kg resulted in strong to severe skin irritation with some weight loss at the higher dose. Toxic effects ranging from weight loss to mortality was observed in rabbits treated repeatedly with very high doses (6 gm/kg) of these oils. Repeated inhalation exposure of middle distillate and diesel vapor and aerosol to rats for 2-4 weeks at up to 6 mg/l resulted in respiratory tract irritation, lung changes/infiltration/accumulation, and some reduction in lung function.

---REPRODUCTIVE TOXICOLOGY (SUMMARY)---

Diesel fuel vapors were tested in an inhalation teratology (developmental toxicity) study in rats and when only minimal maternal toxicity was observed, no fetotoxic or developmental effects were observed. A developmental toxicity study of dermally applied middle distillates did indicate fetotoxicity (reduced litter size, litter weight, increased resorptions) at doses that also caused significant maternal toxicity.

---CHRONIC TOXICOLOGY (SUMMARY)---

Diesel fuel, heating oil and middle distillates have been shown to be carcinogenic in lifetime mouse skin painting bioassays. While in some cases, the tumor incidence is low in the test populations and possibly associated with skin irritation, concurrent evidence from short-term predicative tests (Modified Ames) does indicate some level of mutagenic activity associated with levels of polycyclic aromatic compounds in certain test samples.

---SENSITIZATION (SUMMARY)---

Middle distillate oils were not skin sensitizers when tested in a Modified Buehler Guinea Pig Sensitization Assay.

---OTHER TOXICOLOGY DATA---

Overexposure to diesel exhaust fumes may result in eye irritation, headaches, nausea, and respiratory irritation. Animal studies involving lifetime exposure to high levels of diesel exhaust have produced variable results, with some studies indicating a potential for lung cancer. Limited evidence from epidemiological studies suggest an association between long-term occupational exposure to diesel engine emissions and lung cancer. Diesel engine exhaust typically consists of gases and particulates, including carbon dioxide, carbon monoxide, nitrogen compounds, oxides of sulfur, and hydrocarbons. Diesel exhaust composition will vary with fuel, engine type, load cycle, engine maintenance,

tuning and exhaust gas treatment. Use of adequate ventilation and/or respiratory protection in the presence of diesel exhaust is recommended to minimize exposures. This product contains ethylbenzene. The International Agency for Research on Cancer (IARC) has evaluated ethylbenzene and classified it as possibly carcinogenic to humans (Group 2B) based on sufficient evidence for carcinogenicity in experimental animals, but inadequate evidence for cancer in exposed humans.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL FATE AND EFFECTS:

In the absence of specific environmental data for this product, this assessment is based on information for representative substances.

ECOTOXICITY: Based on test results for similar products, this substance may be toxic to aquatic organisms such as algae and daphnia (EL50/ IrL50 =1-10 mg/L). This substance has also been shown to be toxic to specific fish species (LL50 = 1-10 mg/L for rainbow trout, Atlantic silverside).

MOBILITY: Dissolution of the higher molecular weight hydrocarbon components in water will be limited, but losses through sediment adsorption may be significant.

PERSISTENCE AND DEGRADABILITY: The majority of the components in this product are expected to be inherently biodegradable. The constituents of diesel fuels/heating oil which are volatilized will photodegrade in the atmosphere. The less volatile, more water-soluble components which are aromatic hydrocarbons will also undergo aqueous photodegradation.

BIOACCUMULATIVE POTENTIAL: Not established.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL: Product is suitable for burning for fuel value in compliance with applicable laws and regulations.

RCRA INFORMATION: Disposal of unused product may be subject to RCRA regulations (40 CFR 261). Disposal of the used product may also be regulated due to ignitability, corrosivity, reactivity, or toxicity as determined by the Toxicity Characteristic Leaching Procedure (TCLP).

FLASH: > 55(131) C(F)

14. TRANSPORT INFORMATION

NOTE:The flash point of this material is > 131F. Regulatory classifications vary as follows:

DOT: Flammable Liquid OR Combustible Liquid - (49CFR 173.120(b)(2))
OSHA: Combustible Liquid
IATA/IMO: Flammable Liquid

USA DOT:

SHIPPING NAME: Diesel Fuel
HAZARD CLASS & DIV: COMBUSTIBLE LIQUID
ID NUMBER: NA1993
ERG NUMBER: 128
PACKING GROUP: PG III
STCC: NE
DANGEROUS WHEN WET: No
POISON: No
LABEL(s): NA
PLACARD(s): Combustible
PRODUCT RQ: NA
MARPOL III STATUS: NA

RID/ADR:

HAZARD CLASS: 3
PACKING GROUP: III
LABEL: 3
DANGER NUMBER: 30
UN NUMBER: 1202
SHIPPING NAME: Gas Oil
REMARKS: NA

IMO:

HAZARD CLASS & DIV: 3
UN NUMBER: 1202
PACKING GROUP: PG III
SHIPPING NAME: Gas Oil
LABEL(s): Flammable Liquid
MARPOL III STATUS: NA

ICAO/IATA:

HAZARD CLASS & DIV: 3
ID/UN Number: 1202
PACKING GROUP: PG III
SHIPPING NAME: Gas Oil
SUBSIDIARY RISK: NA
LABEL(s): Flammable Liquid

STATIC ACCUMULATOR (50 picosiemens or less): YES

15. REGULATORY INFORMATION

US OSHA HAZARD COMMUNICATION STANDARD: Product assessed in accordance with OSHA 29 CFR 1910.1200 and determined to be hazardous.

EU Labeling: Product is dangerous as defined by the European Union Dangerous Substances/Preparations Directives.

Symbol: Xn N Harmful, Dangerous for the environment.

Risk Phrase(s): R40-65-66-51/53.

Limited evidence of a carcinogenic effect. Harmful: may cause lung damage if swallowed. Repeated exposure may cause skin dryness or cracking. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrase(s): S24-2-36/37-62.

Avoid contact with skin. Keep out of the reach of children. Wear suitable protective clothing and gloves. If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

Contains: Gas oil - unspecified.

Governmental Inventory Status: All components comply with TSCA, EINECS/ELINCS, AICS, METI, DSL, KOREA, and PHILIPPINES.

U.S. Superfund Amendments and Reauthorization Act (SARA) Title III: This product contains no "EXTREMELY HAZARDOUS SUBSTANCES".

SARA (311/312) REPORTABLE HAZARD CATEGORIES:
FIRE CHRONIC ACUTE

This product contains the following SARA (313) Toxic Release Chemicals:

CHEMICAL NAME	CAS NUMBER	CONC.
ETHYL BENZENE (COMPONENT ANALYSIS)	100-41-4	0.5%

The following product ingredients are cited on the lists below:

CHEMICAL NAME	CAS NUMBER	LIST CITATIONS *
NAPHTHALENE (COMPONENT ANALYSIS) (0.50%)	91-20-3	16, 22
ETHYL BENZENE (COMPONENT ANALYSIS)	100-41-4	1, 8, 24
DIESEL OIL..C9-20	68334-30-5	21, 26

--- REGULATORY LISTS SEARCHED ---

1=ACGIH ALL	6=IARC 1	11=TSCA 4	16=CA P65 CARC	21=LA RTK
2=ACGIH A1	7=IARC 2A	12=TSCA 5a2	17=CA P65 REPRO	22=MI 293
3=ACGIH A2	8=IARC 2B	13=TSCA 5e	18=CA RTK	23=MN RTK
4=NTP CARC	9=OSHA CARC	14=TSCA 6	19=FL RTK	24=NJ RTK
5=NTP SUS	10=OSHA Z	15=TSCA 12b	20=IL RTK	25=PA RTK
				26=RI RTK

* EPA recently added new chemical substances to its TSCA Section 4 test rules. Please contact the supplier to confirm whether the ingredients in this product currently appear on a TSCA 4 or TSCA 12b list.

Code key:CARC=Carcinogen; SUS=Suspected Carcinogen; REPRO=Reproductive

16. OTHER INFORMATION

USE: DIESEL FUEL

NOTE: PRODUCTS OF EXXON MOBIL CORPORATION AND ITS AFFILIATED COMPANIES ARE NOT FORMULATED TO CONTAIN PCBS.

Health studies have shown that many hydrocarbons pose potential human health risks which may vary from person to person. Information provided on this MSDS reflects intended use. This product should not be used for other applications. In any case, the following advice should be considered:

INJECTION INJURY WARNING: If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the ultimate extent of injury.

Precautionary Label Text:

CONTAINS DIESEL OIL.. C9-20

WARNING!

COMBUSTIBLE LIQUID AND VAPOR. RESPIRATORY IRRITATION, HEADACHE, DIZZINESS, NAUSEA, LOSS OF CONSCIOUSNESS, AND IN CASES OF EXTREME EXPOSURE, POSSIBLY DEATH. LOW VISCOSITY MATERIAL-IF SWALLOWED, MAY BE ASPIRATED AND CAN CAUSE SERIOUS OR FATAL LUNG DAMAGE.

MAY CAUSE SKIN CANCER ON PROLONGED, REPEATED SKIN CONTACT. ANIMAL SKIN ABSORPTION STUDIES RESULTED IN INCREASED MORTALITY, EFFECTS ON BODY WEIGHT, THE IMMUNE SYSTEM AND THE UNBORN CHILD. PROLONGED, REPEATED SKIN CONTACT MAY CAUSE IRRITATION. DIESEL EXHAUST MAY CAUSE LUNG CANCER.

Keep away from heat and flame. Avoid prolonged or repeated overexposure by skin contact or inhalation. Use with adequate ventilation. Keep container closed. Keep out of reach of children.

FIRST AID: If inhaled, remove from further exposure. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with a mechanical device or use mouth-to-mouth resuscitation. In case of contact, remove contaminated clothing. Dry wipe the exposed skin and cleanse with waterless hand cleaner and follow by washing thoroughly with soap and water. For those providing assistance, avoid further skin contact to yourself and others. Wear impervious gloves. If swallowed, seek immediate medical attention. Do not induce vomiting. Only induce vomiting at the instruction of a physician.

This warning is given to comply with California Health and Safety Code 25249.6 and does not constitute an admission or a waiver of rights. This product contains a chemical known to the State of California to cause cancer, birth defects, or other reproductive harm. Chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm are created by the combustion of this product. Refer to product Material Safety Data Sheet for further safety and health information.

For Internal Use Only: MHC: 1* 1* 1* 1* 1*, MPPEC: C, TRN: 123455-22,
CMCS97: EMGF22, REQ: PS+C, SAFE USE: C
EHS Approval Date: 03APR2003

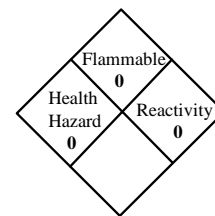
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Prepared by: ExxonMobil Oil Corporation
Environmental Health and Safety Department, Clinton, USA



WYO-BEN, INC.

MATERIAL SAFETY DATA SHEET



NFPA FIRE HAZARD
IDENTIFICATION SYSTEM

I. PRODUCT IDENTIFICATION

Trade Name(s): **ENVIROPLUG® MEDIUM**

Generic Name(s): Wyoming (Western) Bentonite; Bentonite Clay (CAS No. 1302-78-9)

Chemical Name(s): Sodium Montmorillonite (CAS No. 1318-93-0)

Manufacturer: **WYO-BEN, INC.**
Address: P.O. Box 1979
Billings, Montana 59103

Telephone Numbers:
Information: (406) 652-6351
EMERGENCY: (406) 652-6351

II. HAZARDOUS INGREDIENTS

Ingredient	CAS NO.	%	Hazard
Crystalline Silica (SiO ₂) as Quartz	14808-60-7	See Note	Low concentrations of crystalline silica (SiO ₂) in the form of quartz may be present in airborne bentonite dust. See Section VI for discussion of health hazard.

Note: Although the typical quartz content of western bentonite is in the range of 2 to 6% most of the quartz particles are larger than the 10 μ respirable threshold size. The actual respirable quartz concentration in airborne bentonite dust will depend upon bentonite source, fineness of product, moisture content of product, local humidity and wind condition at point of use and other use specific factors.

III. PHYSICAL DATA

Boiling Point (°F): NA	Specific Gravity (H ₂ O=1): 2.45-2.55
Vapor Pressure (mm. Hg): NA	Melting Point: Approx. 1450°C
Vapor Density (Air = 1): NA	Evaporation Rate (Butyl Acetate = 1): NA
Solubility in Water: Insoluble, forms colloidal suspension.	pH: 8-10 (5% aqueous suspension)
Density (at 20° C): 55-68 lbs./cu.ft. as product.	
Appearance and Odor: Bluegray to green as moist solid, light tan to gray as dry powder. No odor.	

IV. FIRE AND EXPLOSION DATA

Flash Point: NA	Flammable Limits: LEL: NA UEL: NA
Special Fire Fighting Procedures: NA	
Unusual Fire and Explosion Hazards: None. Product will not support combustion.	
Extinguishing Media: None for product. Any media can be used for the packaging. Product becomes slippery when wet.	

V. REACTIVITY

Stability: Stable
Hazardous Polymerization: None
Incompatibility: None
Hazardous Decomposition Products: None
NA = Not Applicable ND = Not Determined

VI. HEALTH HAZARD INFORMATION

Routes of Exposure and Effects:

Skin: Possible drying resulting in dermatitis.

Eyes: Mechanical irritant.

Inhalation: *Acute* (short term) exposure to dust levels exceeding the PEL may cause irritation of respiratory tract resulting in a dry cough. *Chronic* (long term) exposure to airborne bentonite dust containing respirable size ($\leq 10 \mu\text{m}$) quartz particles, where respirable quartz particle levels are higher than TLV's, may lead to development of silicosis or other respiratory problems. Persistent dry cough and labored breathing upon exertion may be symptomatic.

Ingestion: No adverse effects.

Permissible Exposure Limits:

(for air contaminants)

Bentonite as "Particulates not otherwise regulated"
(formerly nuisance dust)

Total dust

Respirable dust

Crystalline Quartz (respirable)

OSHA PEL

(8hr. TWA)

15mg/m³

5mg/m³

0.1mg/m³

ACGIH TLV

ND

ND

0.1mg/m³

Carcinogenicity: Bentonite is not listed by ACGIH, IARC, NTP or OSHA. IARC, 1997, concludes that there is sufficient evidence in humans for the carcinogenicity of inhaled crystalline silica from occupational sources (IARC Class 1), that carcinogenicity was not detected in all industrial circumstances studied and that carcinogenicity may depend on characteristics of the crystalline silica or on external factors affecting its biological activity. NTP classifies respirable crystalline silica as "known to be a human carcinogen" (NTP 9th Report on Carcinogens – 2000). ACGIH classifies crystalline silica, quartz, as a suspected human carcinogen (A2).

Acute Oral LD₅₀: ND

Acute Dermal LD₅₀: ND

Aquatic Toxicology LC₅₀: ND

Emergency and First Aid Procedures:

Skin: Wash with soap and water until clean.

Eyes: Flush with water until irritation ceases.

Inhalation: Move to area free from dust. If symptoms of irritation persist contact physician. Inhalation may aggravate existing respiratory illness.

VII. HANDLING AND USE PRECAUTIONS

Steps to be Taken if Material is Released or Spilled: Avoid breathing dust; wear respirator approved for silica bearing dust. Vacuum up to avoid generating airborne dust. Avoid using water. Product slippery when wetted.

Waste Disposal Methods: Product should be disposed of in accordance with applicable local, state and federal regulations.

Handling and Storage Precautions: Use NIOSH/MSHA respirators approved for silica bearing dust when free silica containing airborne bentonite dust levels exceed PEL/TLV's. Clean up spills promptly to avoid making dust. Storage area floors may become slippery if wetted.

VIII. INDUSTRIAL HYGIENE CONTROL MEASURES

Ventilation Requirements: Mechanical, general room ventilation. Use local ventilation to maintain PEL's/TLV's.

Respirator: Use respirators approved by NIOSH/MSHA for silica bearing dust.

Eye Protection: Generally not necessary. Personal preference.

Gloves: Generally not necessary. Personal preference.

Other Protective Clothing or Equipment: None

IX. SPECIAL PRECAUTIONS

Avoid prolonged inhalation of airborne dust.

DEPARTMENT OF TRANSPORTATION HAZARDOUS MATERIAL INFORMATION

Shipping Name: NA (Not Regulated)

Hazard Class: NA

Hazardous Substance: NA

Caution Labeling: NA

Date Prepared: January 2, 2007

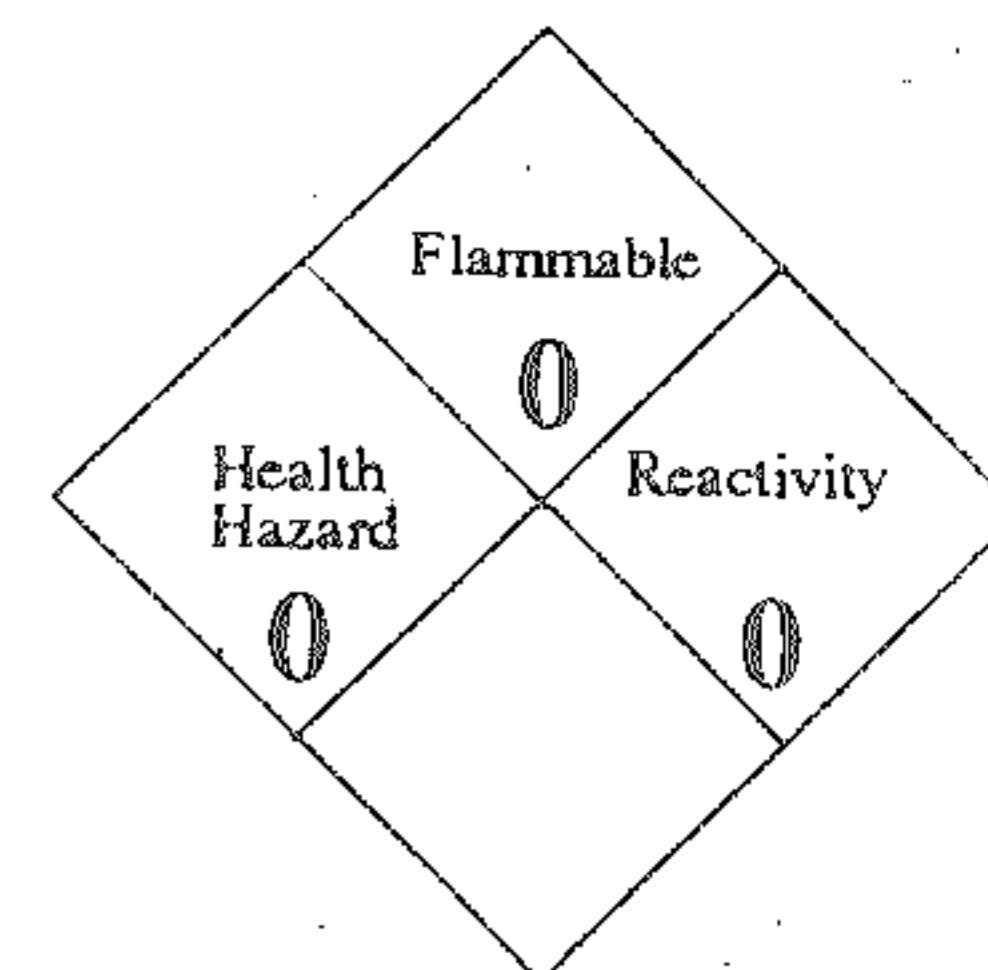
Doc #4230-82:

All information presented herein is believed to be accurate; however, it is the user's responsibility to determine in advance of need that the information is current and suitable for their circumstances. No warranty or guarantee, expressed or implied is made by WYO-BEN, INC. as to this information, or as to the safety, toxicity or effect of the use of this product.



WYO-BEN, INC.

MATERIAL SAFETY DATA SHEET



NFPA FIRE HAZARD IDENTIFICATION SYSTEM

I. PRODUCT IDENTIFICATION

Trade Name(s): ENVIROPLUG® NO. 16

Generic Name(s): Wyoming (Western) Bentonite; Bentonite Clay (CAS No. 1302-78-9)

Chemical Name(s): Sodium Montmorillonite (CAS No. 1318-93-0)

Manufacturer: WYO-BEN, INC.
Address: P.O. Box 1979
Billings, Montana 59103

Telephone Numbers:
Information: (406) 652-6351
EMERGENCY: (406) 652-6351

II. HAZARDOUS INGREDIENTS

Ingredient	CAS No.	%	Hazard
Crystalline Silica (SiO ₂) as Quartz	14808-60-7	See Note	Low concentrations of crystalline silica (SiO ₂) in the form of quartz, may be present in airborne bentonite dust. (See Section VI) for discussion of health hazard.

Note: The concentration level of total free silica in airborne bentonite dust is variable depending upon origin of bentonite ore, fineness of product, moisture content of product, local humidity and wind conditions at point of use, etc. (See Section VI)

III. PHYSICAL DATA

Boiling Point (°F): NA	Specific Gravity (H ₂ O=1): 2.45-2.55
Vapor Pressure (mm. Hg): NA	Melting Point: Approx. 1450°C
Vapor Density (Air = 1): NA	Evaporation Rate (Butyl Acetate = 1): NA
Solubility in Water: Insoluble, forms colloidal suspension.	pH: 8-10 (5% aqueous suspension)
Density (at 20° C): 62 lbs./cu.ft.	
Appearance and Odor: Bluegray to green as moist solid, light tan to gray as dry powder. No odor.	

IV. FIRE AND EXPLOSION DATA

Flash Point: NA	Flammable Limits: LEL: NA UEL: NA
Special Fire Fighting Procedures: NA	
Unusual Fire and Explosion Hazards: None. Product will not support combustion.	
Extinguishing Media: None for product. Any media can be used for the packaging. Product becomes slippery when wet.	

V. REACTIVITY

Stability: Stable
Hazardous Polymerization: None
Incompatibility: None
Hazardous Decomposition Products: None

NA = Not Applicable

ND = Not Determined

Date Prepared: May 1, 1994

VI. HEALTH HAZARD INFORMATION

Routes of Exposure and Effects:

Skin: Possible drying resulting in dermatitis.

Eyes: Mechanical irritant.

Inhalation: Acute (short term) exposure to dust levels exceeding the PEL may cause irritation of respiratory tract resulting in a dry cough.

Chronic (long term) exposure to free silica containing airborne bentonite dust where levels are higher than TLV's may lead to development of silicosis or other respiratory problems. Persistent dry cough and labored breathing upon exertion are symptomatic.

Ingestion: No adverse effects.

Permissible Exposure Limits: (for air contaminants)

OSHA PEL
(8hr. TWA)

ACGIH TLV

Bentonite as "Particulates not otherwise regulated"
(formerly as nuisance dust)

Total dust	15mg/m ³	ND
Respirable dust	5mg/m ³	ND
Crystalline Quartz (respirable)	0.1mg/m ³	0.1mg/m ³

Where cristobalite or tridymite are present use 1/2 of the PEL or TLV value for crystalline quartz.

Carcinogenicity: Bentonite is not listed by NTP, IARC or OSHA. IARC, 1987, concludes that there is limited evidence suggesting the carcinogenicity in humans of inhaled crystalline silica (IARC Class 2A).

Acute Oral LD₅₀: ND

Acute Dermal LD₅₀: ND

Aquatic Toxicology LC₅₀: ND

Emergency and First Aid Procedures:

Skin: Wash with soap and water until clean.

Eyes: Flush with water until irritation ceases.

Inhalation: Move to area free from dust. If symptoms of irritation persist contact physician. Inhalation may aggravate existing respiratory illness.

VII. HANDLING AND USE PRECAUTIONS

Steps to be Taken if Material is Released or Spilled: Avoid breathing dust; wear respirator approved for silica bearing dust. Vacuum up to avoid generating airborne dust. Avoid using water. Product slippery when wetted.

Waste Disposal Methods: Product should be disposed of in accordance with applicable local, state and federal regulations.

Handling and Storage Precautions: Use NIOSH/MSHA respirators approved for silica bearing dust when free silica containing airborne bentonite dust levels exceed PEL/TLV's. Clean up spills promptly to avoid making dust. Storage area floors may become slippery if wetted.

VIII. INDUSTRIAL HYGIENE CONTROL MEASURES

Ventilation Requirements: Mechanical, general room ventilation. Use local ventilation to maintain PEL's/TLV's.

Respirator: Use respirators approved by NIOSH/MSHA for silica bearing dust.

Eye Protection: Generally not necessary. Personal preference.

Gloves: Generally not necessary. Personal preference.

Other Protective Clothing or Equipment: None

IX. SPECIAL PRECAUTIONS

Avoid prolonged inhalation of airborne dust.

DEPARTMENT OF TRANSPORTATION INFORMATION

Shipping Name: Common Ground Clay (NOIBN)

Hazard Class: Not Hazardous

Hazardous Substance: None

Cautionary Labeling: None required

Date Prepared: May 1, 1994

All information presented herein is believed to be accurate, however, it is the user's responsibility to determine in advance of need that the information is current and suitable for their circumstances. No warranty or guarantee, expressed or implied is made by WYO-BEN, INC. as to this information, or as to the safety, toxicity or effect of the use of this product.



Section 1. Chemical Product and Company Identification	
Trade name	Ethylbenzene
Supplier	TOTAL PETROCHEMICALS USA, INC. P O Box 674411 Houston,Tx. 77267-4411
Synonym	Ethylbenzene, Phenylethane, EB
MSDS Name	Ethylbenzene
Chemical Family	Aromatic.
CAS Registry Number	100-41-4
Threshold Limit Value	ACGIH TLV (United States, 1/2005). : STEL: 125 ppm 15 minute(s). Form: All forms TWA: 100 ppm 8 hour(s). Form: All forms OSHA PEL (United States, 8/1997). TWA: 435 mg/m ³ 8 hour(s). Form: All forms TWA: 100 ppm 8 hour(s). Form: All forms Consult local authorities for acceptable exposure limits.
Manufacturer	TOTAL PETROCHEMICALS USA, INC. Styrene Joint Venture P.O. Box 11 Carville, LA 70721
Code	ETHYLBENZENE
MSDS#	P81
Validation Date	1/1/2008
Print Date	1/1/2008
Responsible for Preparation	Paul Bradley
In Case of Emergency	Chemtrec: (800) 424-9300 TOTAL PETROCHEMICALS USA, INC: (800) 322-3462
Technical Information	Carville: 225-642-4300

Section 2. Composition and Information on Ingredients			
Name	CAS #	% by Weight	Exposure Limits
Ethylbenzene	100-41-4	99 - 99.9	ACGIH TLV (United States, 1/2005). STEL: 125 ppm 15 minute(s). Form: All forms TWA: 100 ppm 8 hour(s). Form: All forms OSHA PEL (United States, 8/1997). TWA: 435 mg/m ³ 8 hour(s). Form: All forms TWA: 100 ppm 8 hour(s). Form: All forms
Benzene	71-43-2	0.1 - 1	ACGIH TLV (United States, 1/2005). Skin STEL: 8 mg/m ³ 15 minute(s). Form: All forms STEL: 2.5 ppm 15 minute(s). Form: All forms TWA: 1.6 mg/m ³ 8 hour(s). Form: All forms TWA: 0.5 ppm 8 hour(s). Form: All forms OSHA PEL (United States, 8/1997). STEL: 5 ppm 15 minute(s). Form: All forms TWA: 1 ppm 8 hour(s). Form: All forms

Section 3. Hazards Identification	
Physical State and Appearance	Liquid. (Liquid)
Emergency Overview	FLAMMABLE LIQUID AND VAPOR. MAY CAUSE RESPIRATORY TRACT AND EYE IRRITATION. MAY CAUSE ALLERGIC RESPIRATORY REACTION. MAY BE HARMFUL IF ABSORBED THROUGH SKIN. HARMFUL IF INHALED OR SWALLOWED. CONTAINS MATERIAL WHICH CAN CAUSE CANCER. BIRTH DEFECT HAZARD. CAUSES DAMAGE TO THE FOLLOWING ORGANS: BLOOD, KIDNEYS, LUNGS, NERVOUS SYSTEM, LIVER, BRAIN, RESPIRATORY TRACT, SKIN, EYES, CENTRAL NERVOUS SYSTEM, EYE, LENS OR CORNEA.
Routes of Entry	Eye contact. Ingestion. Inhalation. Skin contact.
Potential Acute Health Effects	
Continued on Next Page	

Eyes	Hazardous in case of eye contact (severe irritant).
Skin	Hazardous in case of skin contact (irritant). Severe over-exposure can result in death. Skin inflammation is characterized by itching, scaling, reddening, or, occasionally, blistering.
Inhalation	Very hazardous in case of inhalation. Hazardous in case of inhalation (lung irritant and sensitizer). May be fatal if inhaled.
Ingestion	Very hazardous in case of ingestion. May be fatal if swallowed. Possible pneumonia if vomited.
Potential Chronic Health Effects	CARCINOGENIC EFFECTS: Classified A3 (Proven for animals.) by ACGIH, 2B (Possible for humans.) by IARC [Ethylbenzene]. Classified None. by OSHA [Ethylbenzene]. This material contains benzene at low levels. Benzene is a known human carcinogen under IARC, NTP, and OSHA. MUTAGENIC EFFECTS: Not available. TERATOGENIC EFFECTS: Classified None. for humans [Ethylbenzene].
Medical Conditions Aggravated by Overexposure	Not available.
Overexposure /Signs/Symptoms	Headaches, dizziness, fatigue, eye, nose and throat irritation. Target organs: Eyes, upper respiratory system, skin, CNS, lung, liver, kidney, skin (dermatitis), eye (conjunctivitis and other eye injuries), upper respiratory system disorders, and central nervous system disorders.
See Toxicological Information (Section 11)	

Section 4. First Aid Measures

Eye Contact	Check for and remove any contact lenses. IMMEDIATELY flush eyes with running water for at least 15 minutes, keeping eyelids open. COLD water may be used. DO NOT use an eye ointment. Seek medical attention.
Skin Contact	If the chemical got onto the clothed portion of the body, remove the contaminated clothes as quickly as possible, protecting your own hands and body. Place the victim under a deluge shower. Wash thoroughly with soap and water. Launder contaminated clothes.
Inhalation	Allow the victim to rest in a well ventilated area. Seek immediate medical attention. If the victim is not breathing, perform mouth-to-mouth resuscitation.
Ingestion	DO NOT induce vomiting or give liquids. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.
Notes to Physician	Ingestion: cautious gastric lavage followed by administration of activated charcoal may be of benefit if the patient is seen soon after the exposure. Inhalation: if bronchospasm and wheezing occur, consider treatment with inhaled sympathomimetic agents. If pulmonary edema (noncardiogenic) occurs, then maintain ventilation and oxygenation with close arterial blood gas monitoring. Early use of PEEP and mechanical ventilation may be needed to maintain pO ₂ greater than 50 mmHG with FIO ₂ less than 60%.

Section 5. Fire Fighting Measures

Flammability of the Product	Flammable.
Auto-ignition Temperature	432°C (809.6°F)
Flash Points	Closed cup: 12.778°C (55°F). (Tagliabue.) Open cup: 21°C (69.8°F).
Flammable Limits	LOWER: 1.3% UPPER: 7.1%
Products of Combustion	These products are carbon oxides (CO, CO ₂).
Fire Hazards in Presence of Various Substances	Extremely flammable in presence of open flames and sparks, or heat.
Explosion Hazards in Presence of Various Substances	Risks of explosion of the product in presence of mechanical impact: Not expected. Risks of explosion of the product in presence of static discharge: Expected.

Continued on Next Page

Fire Fighting Media and Instructions	Flammable liquid. SMALL FIRE: Use DRY chemicals, CO2, alcohol foam, water spray, or halon. LARGE FIRE: Use alcohol foam, water spray or fog.
Protective Clothing (Fire)	Wear MSHA/NIOSH approved self-contained breathing apparatus or equivalent and full protective gear.
Special Remarks on Fire Hazards	Flammable.
Special Remarks on Explosion Hazards	No additional remark.


Section 6. Accidental Release Measures

Small Spill and Leak	Absorb with an inert material and put the spilled material in an appropriate waste disposal.
Large Spill and Leak	Flammable liquid, insoluble in water. Contain spill and safely stop the flow. Warn personnel to move away. Eliminate all sources of ignition. Ventilate. Absorb with DRY earth, sand or other non-combustible material.

Section 7. Handling and Storage

Handling	DO NOT ingest. Do not breathe gas, fumes, vapor or spray. Wear suitable protective clothing. In case of insufficient ventilation, wear suitable respiratory equipment. If ingested, seek medical advice immediately and show the container or the label. Avoid contact with skin and eyes. Keep away from incompatibles such as oxidizing agents, acids.
Storage	Keep container tightly closed. Keep in a cool, well-ventilated place. Flammable materials should be stored in a separate safety storage cabinet or room.

Section 8. Exposure Controls/Personal Protection

Engineering Controls	Provide exhaust ventilation or other engineering controls to keep the airborne concentrations of vapors below their respective threshold limit value. Ensure that eyewash stations and safety showers are proximal to the work-station location.
Personal Protection	<p><i>Eyes</i> Splash goggles. Safety glasses.</p> <p><i>Body</i> Flame retardant clothing covering the entire body.</p> <p><i>Respiratory</i> At high concentrations be sure to use a MSHA/NIOSH approved respirator or equivalent.</p> <p><i>Hands</i> Gloves (impervious).</p> <p><i>Feet</i> Non-slip safety shoes in areas where spills or leaks can occur.</p>
Protective Clothing (Pictograms)	
Personal Protection in Case of a Large Spill	Splash goggles. Full suit. Vapor and dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Product Name	Exposure Limits
Ethylbenzene	<p>ACGIH TLV (United States, 1/2005). STEL: 125 ppm 15 minute(s). Form: All forms TWA: 100 ppm 8 hour(s). Form: All forms</p> <p>OSHA PEL (United States, 8/1997). TWA: 435 mg/m³ 8 hour(s). Form: All forms TWA: 100 ppm 8 hour(s). Form: All forms</p>
Benzene	<p>ACGIH TLV (United States, 1/2005). Skin STEL: 8 mg/m³ 15 minute(s). Form: All forms STEL: 2.5 ppm 15 minute(s). Form: All forms TWA: 1.6 mg/m³ 8 hour(s). Form: All forms TWA: 0.5 ppm 8 hour(s). Form: All forms</p> <p>OSHA PEL (United States, 8/1997). STEL: 5 ppm 15 minute(s). Form: All forms</p>

TWA: 1 ppm 8 hour(s). Form: All forms

Consult local authorities for acceptable exposure limits.

Section 9. Physical and Chemical Properties

Physical State and Appearance	Liquid. (Liquid)	Odor	Sweet (aromatic) odor.
Molecular Weight	Not applicable.	Taste	Not available.
Molecular Formula	C6H5-CH2-CH3	Color	Colorless liquid with distinctive aromatic odor
pH (1% Soln/Water)	Not applicable.		
Boiling/Condensation Point	136.11°C (277°F)		
Melting/Freezing Point	-95°C (-139°F)		
Critical Temperature	343.89°C (651°F)		
Specific Gravity	0.864 (Water = 1)		
Vapor Pressure	10 mm of Hg (@ 25.6°C)		
Vapor Density	3.66 (Air = 1)		
Volatility	100% (v/v).		
Odor Threshold	Not available.		
Evaporation Rate	94 times slower compared to Ethylether		
VOC	100 (%)		
Viscosity	Not available.		
LogK_{ow}	The product is more soluble in oil; log(oil/water) = 3.1		
Ionicity (in Water)	Not available.		
Dispersion Properties	Not available.		
Solubility in Water	Negligible.		
Physical Chemical Comments	No additional remark.		

Section 10. Stability and Reactivity

Stability and Reactivity	The product is stable.
Conditions of Instability	Avoid heat, sparks, & static electricity.
Incompatibility with Various Substances	Reactive with oxidizing agents.
Hazardous Decomposition Products	Carbon monoxide & carbon dioxide.
Hazardous Polymerization	No.

Section 11. Toxicological Information

Toxicity to Animals	Acute oral toxicity (LD50): 5.46 g/kg [Rat]. Skin toxicity (LD50): 17.8 g/kg [Rabbit].
Chronic Effects on Humans	CARCINOGENIC EFFECTS: Classified A3 (Proven for animals.) by ACGIH, 2B (Possible for humans.) by IARC [Ethylbenzene]. Classified None. by OSHA [Ethylbenzene]. This material contains low levels of benzene, which is a known human carcinogen listed under IARC, NTP, and OSHA. TERATOGENIC EFFECTS: Classified None. for humans [Ethylbenzene]. DEVELOPMENTAL TOXICITY: Classified Reproductive system/toxin/female, Reproductive

Continued on Next Page

	system/toxin/male [PROVEN] [Benzene]. Causes damage to the following organs: blood, kidneys, lungs, the nervous system, liver, brain, upper respiratory tract, skin, eyes, central nervous system (CNS), eye, lens or cornea.
Other Toxic Effects on Humans	Very hazardous in case of ingestion, of inhalation. Hazardous in case of skin contact (permeator), of eye contact (irritant). Slightly hazardous in case of skin contact (irritant). Aspiration of even a small amt of ethylbenzene may cause severe injury, since its low viscosity and surface tension will cause it to spread over a large surface of pulmonary tissue.
Special Remarks on Toxicity to Animals	NTP has concluded that kidney tumors in rats exposed in chronic inhalation studies indicate clear evidence of carcinogenic activity.
Special Remarks on Chronic Effects on Humans	No additional remark.
Special Remarks on Other Toxic Effects on Humans	Possible cardiac and dermal sensitizer (benzene).



Section 12. Ecological Information

Ecotoxicity	ECOTOXICITY VALUES (HSDB, 1996; CHRIS, 1996): LC50, Lepomis macrochirus, 32 mg/L/96 hr; LC50, Carassius auratus, 94.44 mg/L/96 hr; LC50, Lebistes reticulatus, 97.10 mg/L/96 hr; LC50, Mysidopsis bahia (shrimp), 87.6 mg/L/96 hr; LC50, Cyprinodon variegatus (sheepshead minnow), 275 mg/L/96 hr; LC50, Pimephales promelas (fathead minnow), 42.3 (hard water) to 48.5 (soft water) mg/L/96 hr; LC50, Poecilla reticulata (guppy), 97.1 mg/L/96 hr; LC50, Palaemonetes pugio (grass shrimp, adult), 14,400 mcg/L/24 hr; LC50, Palaemonetes pugio (grass shrimp, larva), 10,200 mcg/L/24 hr; LC50, fathead minnows, 12.1 mg/L/96 hr.
BOD5 and COD	Not available.
Biodegradable/OECD	Biodegradation of ethylbenzene is fairly rapid in sewage or activated sludge inoculua. It is totally degraded in groundwater in 8 days and seawater in 10 days.
Mobility	In the atmosphere, it exists primarily in the vapor phase based on its vapor pressure. It photochemically degrades by reaction with hydroxyl radicals (half-life 0.5 to 2 days) and partially returns to the earth in rain. Degradation occurs faster under smog conditions. Photooxidation products include ethylphenol, benzaldehyde, acetophenone and m- and p- ethylnitrobenzene. In water, ethylbenzene's concentration decreases by evaporation and biodegradation. The rate of decrease is dependent on the season. Half-lives in water range from several days to 2 weeks. Some ethylbenzene is absorbed by sediment, but bioconcentration in fish is not expected to be significant. Ethylbenzene is adsorbed moderately by soil. It does not significantly hydrolyze in either water or soil. Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.
Toxicity of the Products of Biodegradation	No additional information.
Special Remarks on the Products of Biodegradation	No additional remark.

Section 13. Disposal Considerations

Waste Information	Recover free liquid. Transfer to a safe disposal area in accordance with federal, state, and local regulations.
Waste Stream	Recover free liquid. Transfer to a safe disposal area in accordance with federal, state, and local regulations.
Consult your local or regional authorities.	

Section 14. Transport Information (for bulk shipments, non-bulk shipments may differ)

DOT Classification for Bulk Shipments (non bulk shipments may differ)	DOT CLASS 3: Flammable liquid.	
DOT Proper Shipping Name	Ethylbenzene, 3, UN1175, PGII RQ	
UN Number	UN1175	
Packing Group	II	
USCG Proper Shipping Name	Ethylbenzene	
Marine Pollutant	Not listed in Appendix B to 49 CFR 172.101.	
Hazardous Substances Reportable Quantity	454 Kg	
Special Provisions for Transport	See codes as shown in 49CFR172.101column 7	
TDG Classification	3	
ADR/RID Classification	3	
IMO/IMDG Classification	3	
ICAO/IATA Classification	3	

Section 15. Regulatory Information

HCS Classification	Flammable liquid
U.S. Federal Regulations	<p>TSCA inventory: All components are listed on TSCA inventory. TSCA 8(a) PAIR: Ethylbenzene</p> <p>SARA 302/304/311/312 extremely hazardous substances: No products were found. SARA 302/304 emergency planning and notification: No products were found. SARA 302/304/311/312 hazardous chemicals: Ethylbenzene SARA 311/312 MSDS distribution - chemical inventory - hazard identification: Ethylbenzene: Fire hazard, Immediate (acute) health hazard, Delayed (chronic) health hazard</p> <p>Clean Water Act (CWA) 307: Ethylbenzene Clean Water Act (CWA) 311: Ethylbenzene</p> <p>Clean Air Act (CAA) 112 accidental release prevention: No products were found. Clean Air Act (CAA) 112 regulated flammable substances: No products were found. Clean Air Act (CAA) 112 regulated toxic substances: No products were found.</p>
International Regulations	
WHMIS (Canada)	<p>Class B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).</p> <p>CEPA DSL: Ethylbenzene</p> <p>Canadian NPRI: Ethylbenzene</p>
EINECS	Not available.
DSCL (EEC)	<p>R11- Highly flammable. R20- Harmful by inhalation.</p>
International Lists	<p>Australia (NICNAS): Ethylbenzene</p> <p>China: Ethylbenzene</p> <p>Germany water class: Ethylbenzene</p> <p>Japan (METI): Ethylbenzene</p> <p>Korea (TCCL): Ethylbenzene</p>

Continued on Next Page

Philippines (RA6969): Ethylbenzene

State Regulations

Pennsylvania RTK Hazardous Substances: Ethylbenzene: (environmental hazard, generic environmental hazard)
 Florida: Ethylbenzene
 Minnesota: Ethylbenzene
 Michigan Critical Material: Benzene
 Massachusetts Substances: Ethylbenzene
 New Jersey: Ethylbenzene

WARNING: This product contains a chemical or chemicals known to the state of California to cause cancer, birth defects or other reproductive harm.: Benzene

WARNING: This product contains a chemical or chemicals known to the state of California to cause reproductive harm (male).: Benzene

California prop. 65 (no significant risk level): Ethylbenzene

WARNING: This product contains a chemical or chemicals known to the state of California to cause cancer.: Ethylbenzene

Section 16. Other Information**Label requirements**

FLAMMABLE LIQUID AND VAPOR.
 MAY CAUSE RESPIRATORY TRACT AND EYE IRRITATION.
 MAY CAUSE ALLERGIC RESPIRATORY REACTION.
 MAY BE HARMFUL IF ABSORBED THROUGH SKIN.
 HARMFUL IF INHALED OR SWALLOWED.
 CONTAINS MATERIAL WHICH CAN CAUSE CANCER.
 BIRTH DEFECT HAZARD.
 CAUSES DAMAGE TO THE FOLLOWING ORGANS: BLOOD, KIDNEYS, LUNGS,
 NERVOUS SYSTEM, LIVER, BRAIN, RESPIRATORY TRACT, SKIN, EYES, CENTRAL
 NERVOUS SYSTEM, EYE, LENS OR CORNEA.

Hazardous Material Information System (U.S.A.)

Health	*	2
Fire Hazard		3
Reactivity		0
Personal Protection		

National Fire Protection Association (U.S.A.)**References**

- NIOSH Pocket Guide
 -HSDB - Hazardous Substances Data Bank
 -RTECS - Registry of Toxic Effects of Chemicals Substances
 Chemtox Database

Other Special Considerations

No additional remark.

Validated by Paul Bradley on 1/1/2008.

Verified by Karen Scheel.

Printed 1/1/2008.

Chemtrec:

(800) 424-9300

TOTAL PETROCHEMICALS USA, INC:

(800) 322-3462

Notice to Reader

To the best of our knowledge, the information contained herein is accurate. However, neither the above named supplier nor any of its subsidiaries assumes any liability whatsoever for the accuracy or completeness of the information contained herein. Final determination of suitability of any material is the sole responsibility of the user. All materials may present unknown hazards and should be used with caution. Although certain hazards are described herein, we cannot guarantee that these are the only hazards that exist.

ExxonMobil

35014-00 MOBIL UNLEADED GASOLINE
MATERIAL SAFETY DATA BULLETIN

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: MOBIL UNLEADED GASOLINE
SUPPLIER: EXXONMOBIL OIL CORPORATION
3225 GALLOWS RD.
FAIRFAX, VA 22037

24 - Hour Health and Safety Emergency (call collect): 609-737-4411

24 - Hour Transportation Emergency:
CHEMTREC: 800-424-9300 202-483-7616
LUBES AND FUELS: 281-834-3296

Product and Technical Information:
Lubricants and Specialties: 800-662-4525 800-443-9966
Fuels Products: 800-947-9147
MSDS Fax on Demand: 613-228-1467
MSDS Internet Website: <http://emmsds.ihssolutions.com/>

2. COMPOSITION/INFORMATION ON INGREDIENTS

CHEMICAL NAMES AND SYNONYMS: GASOLINE AND PROPRIETARY ADDITIVES

GLOBALLY REPORTABLE MSDS INGREDIENTS:

Substance Name	Approx. Wt%
GASOLINE	100

COMPONENT(S) OF PRODUCT INGREDIENTS INCLUDE:

METHYL-TERT-BUTYL ETHER (1634-04-4)	< 16
ETHANOL (64-17-5)	< 11
XYLENE (1330-20-7)	10
TRIMETHYL BENZENE (25551-13-7)	8
TOLUENE (108-88-3)	6

ETHYL BENZENE (100-41-4)	3
N-HEXANE (110-54-3)	3
BENZENE (71-43-2)	2
NAPHTHALENE (91-20-3)	0.5

NOTE: The concentration of the components shown above may vary substantially. In certain countries benzene content may be limited to lower levels (eg. US reformulated gasoline). Oxygenates such as tertiary-amyl-methyl ether, ethanol, di-isopropyl ether, and ethyl-tertiary-butyl ether may be present (eg. concentration to provide a minimum oxygen content of 1.5 Wt% in the US). Because of volatility considerations, gasoline vapor may have concentrations of components very different from those of liquid gasoline. The major components of gasoline vapor are: butane, isobutane, pentane and isopentane. The reportable component percentages, shown in the Regulatory Information section, are based on API's evaluation of a typical gasoline mixture.

See Section 8 for exposure limits (if applicable).

3. HAZARDS IDENTIFICATION

This product is considered hazardous according to regulatory guidelines (See Section 15).

EMERGENCY OVERVIEW: Clear (May Be Dyed) Liquid. **EXTREMELY FLAMMABLE, HIGH HAZARD.** Liquid can release considerable vapor at temperatures below ambient which readily form flammable mixtures. Vapors settle to ground level and may reach, via drains and other underground passages, ignition sources remote from the point of escape. Product can accumulate a static charge which may cause a fire or explosion. DOT ERG No. : 128

POTENTIAL HEALTH EFFECTS: Skin irritation. May cause eye and respiratory irritation, headache, dizziness, nausea, loss of consciousness, and in cases of extreme exposure, possibly death. Low viscosity material-if swallowed may enter the lungs and cause lung damage. Overexposure to benzene may result in cancer, blood disorders and damage to the bone marrow. Long-term exposure to gasoline vapor has caused kidney and liver cancer in laboratory animals. Case reports of chronic gasoline abuse (such as sniffing) and chronic misuse as a solvent or as a cleaning agent have shown a range of nervous system effects, sudden deaths from heart attacks, blood effects and leukemia. These effects are not expected to occur at exposure levels encountered in the distribution and use of gasoline as a motor fuel.

POTENTIAL ENVIRONMENTAL EFFECTS: Toxic to aquatic organisms; may cause long-term adverse effects in the aquatic environment.

For further health effects/toxicological data, see Section 11.

4. FIRST AID MEASURES

EYE CONTACT: Flush thoroughly with water. If irritation occurs, call a physician.

SKIN CONTACT: Wash contact areas with soap and water. Immediately remove contaminated clothing, including shoes. (See Section 16 - Injection Injury)

INHALATION: Remove from further exposure. If respiratory irritation, dizziness, nausea, or unconsciousness occurs, seek immediate medical assistance. If breathing has stopped, assist ventilation with mechanical device or use mouth-to-mouth resuscitation.

INGESTION: Seek immediate medical attention. Do not induce vomiting.

NOTE TO PHYSICIANS: Material if ingested may be aspirated into the lungs and can cause chemical pneumonitis. **PRE-EXISTING MEDICAL CONDITIONS WHICH MAY BE AGGRAVATED BY EXPOSURE:** Skin contact may aggravate an existing dermatitis. Benzene- Individuals with liver disease may be more susceptible to toxic effects. Hexane- Individuals with neurological disease should avoid exposure.

5. FIRE-FIGHTING MEASURES

EXTINGUISHING MEDIA: Carbon Dioxide, Foam, Dry Chemical, Water Fog.

SPECIAL FIRE FIGHTING PROCEDURES: Evacuate area. For large spills, fire fighting foam is the preferred agent and should be applied in sufficient quantities to blanket the product surface. Water may be ineffective, but water should be used to keep fire-exposed containers cool. Water spray may be used to flush spill away from exposures, but good judgement should be practiced to prevent spreading of the product into sewers, streams or drinking water supplies. If a leak or spill has not ignited, apply a foam blanket to suppress the release of vapors. If foam is not available, a water spray curtain can be used to disperse vapors and to protect personnel attempting to stop the leak.

SPECIAL PROTECTIVE EQUIPMENT: For fires in enclosed areas, fire fighters must use self-contained breathing apparatus.

UNUSUAL FIRE AND EXPLOSION HAZARDS: EXTREMELY FLAMMABLE, HIGH HAZARD. Liquid can release considerable vapor at temperatures below ambient which readily form flammable mixtures. Vapors settle to ground level and may reach, via drains and other underground passages, ignition sources remote from the point of escape. Product can accumulate a static charge which may cause a fire or explosion.

COMBUSTION PRODUCTS: Fumes, smoke, carbon monoxide, sulfur oxides, aldehydes and other decomposition products, in the case of incomplete combustion.

Flash Point C(F): < -40(-40) (ASTM D-56).

Flammable Limits (approx.% vol.in air) - LEL: 1.4%, UEL: 7.6%

NFPA HAZARD ID: Health: 1, Flammability: 3, Reactivity: 0

6. ACCIDENTAL RELEASE MEASURES

NOTIFICATION PROCEDURES: Report spills/releases as required to appropriate authorities. U.S. Coast Guard and EPA regulations

require immediate reporting of spills/releases that could reach any waterway including intermittent dry creeks. Report spill/release to Coast Guard National Response Center toll free number (800)424-8802. In case of accident or road spill notify CHEMTREC (800) 424-9300.

PROCEDURES IF MATERIAL IS RELEASED OR SPILLED:

LAND SPILL: Eliminate sources of ignition. Warn occupants in downwind areas of fire and explosion hazard. Shut off source taking normal safety precautions. Take measures to minimize the effects on ground water. Recover by pumping using explosion-proof equipment or contain spilled liquid with sand or other suitable absorbent and remove mechanically into containers. If necessary, dispose of adsorbed residues as directed in Section 13.

WATER SPILL: Eliminate sources of ignition. Advise occupants and ships in the vicinity in downwind areas of fire and explosion hazard and warn them to stay clear. Notify port and other relevant authorities. Do not confine in area of leakage. Allow liquid to evaporate from the surface. Do not use dispersants.

ENVIRONMENTAL PRECAUTIONS: Prevent material from entering sewers, water sources or low lying areas; advise the relevant authorities if it has, or if it contaminates soil/vegetation.

PERSONAL PRECAUTIONS: See Section 8

7. HANDLING AND STORAGE

HANDLING: USE NON-SPARKING TOOLS AND EXPLOSION-PROOF EQUIPMENT. NEVER SIPHON GASOLINE BY MOUTH. GASOLINE SHOULD NOT BE USED AS A SOLVENT OR AS A CLEANING AGENT. Avoid contact with skin. Avoid inhalation of vapors or mists. Use in well ventilated area away from all ignition sources. This liquid is volatile and gives off invisible vapors. Either the liquid or vapor may settle in low areas or travel some distance along the ground or surface to ignition sources where they may ignite or explode. Use product with caution around heat, sparks, pilot lights, static electricity, and open flames. It is unlawful and dangerous to put gasoline into unapproved containers. Do not fill container in or on a vehicle. Static electricity may ignite vapors and cause fire. Place container on ground when filling and keep nozzle in contact with container. See Section 8 for additional personal protection advice when handling this product.

STORAGE: Drums must be grounded and bonded and equipped with self-closing valves, pressure vacuum bungs and flame arresters. Store away from all ignition sources in a cool, well ventilated area equipped with an automatic sprinkling system. Outside or detached storage preferred. Storage containers should be grounded and bonded.

SPECIAL PRECAUTIONS: To prevent and minimize fire or explosion risk from static accumulation and discharge, effectively bond and/or ground product transfer system. Do not use electronic devices (including but not limited to cellular phones, computers, calculators, pagers, etc.) in or around any fueling operation or storage area unless the devices are certified intrinsically safe by an approved national testing agency and to the safety standards required by national and/or local laws and regulations. Electrical equipment and fittings must comply with local fire prevention regulations for this class of product. Use the correct grounding procedures. Refer to national or local regulations covering safety at petroleum handling and storage areas for this product.

EMPTY CONTAINER WARNING: Empty containers retain residue (liquid and/or vapor) and can be dangerous. DO NOT PRESSURIZE, CUT, WELD, BRAZE, SOLDER, DRILL, GRIND OR EXPOSE SUCH CONTAINERS TO HEAT, FLAME, SPARKS, STATIC ELECTRICITY, OR OTHER SOURCES OF IGNITION; THEY MAY EXPLODE AND CAUSE INJURY OR DEATH. Do not attempt to refill or clean container since residue is difficult to remove. Empty drums should be completely drained, properly bunged and promptly returned to a drum reconditioner. All containers should be disposed of in an environmentally safe manner and in accordance with governmental regulations.

 8. EXPOSURE CONTROLS/PERSONAL PROTECTION

OCCUPATIONAL EXPOSURE LIMITS:

ExxonMobil recommends an 8-hour time-weighted average (TWA) exposure of 300 mg/m3 (100 ppm vapor).

Substance Name (CAS-No.)	Source	---TWA---		----STEL----		NOTE
		ppm	mg/m3	ppm	mg/m3	
GASOLINE	OSHA	300	900	500	1500	
	ACGIH	300	890	500	1480	
METHYL-TERT-BUTYL ETHER (1634-04-4)	ACGIH	40	144			
	XOM	25		75		
ETHANOL (64-17-5)	OSHA	1000	1900			
	ACGIH	1000	1880			
XYLENE (1330-20-7) O, M, P, -Isomers	OSHA	100	435	150	655	
	ACGIH	100	434	150	651	
TRIMETHYL BENZENE (25551-13-7)	OSHA	25	125			
	ACGIH	25	123			
TOLUENE (108-88-3) Skin	OSHA	100	375	150	560	
	ACGIH	50	188			
	XOM		200			
ETHYL BENZENE (100-41-4)	OSHA	100	435	125	545	
	ACGIH	100	434	125	543	
N-HEXANE (110-54-3)						

	OSHA	50	180		
Other Isomers	OSHA	500	1800	1000	3600
N-Hexane Skin	ACGIH	50	176		
Other Isomers	ACGIH	500	1760	1000	3500
BENZENE (71-43-2)					
	OSHA	1		5	
Skin	ACGIH	0.5	1.6	2.5	8
NAPHTHALENE (91-20-3)					
	OSHA	10	50	15	75
	ACGIH	10	52	15	79

NOTE: Limits shown for guidance only. Follow applicable regulations.

VENTILATION: Ventilation equipment must be explosion proof.

RESPIRATORY PROTECTION: Approved respiratory equipment must be used when airborne concentrations are unknown or exceed the recommended exposure limit. Self-contained breathing apparatus may be required for use in confined or enclosed spaces.

EYE PROTECTION: If splash with liquid is possible, chemical type goggles should be worn.

SKIN PROTECTION: Impervious gloves should be worn. Good personal hygiene practices should always be followed.

9. PHYSICAL AND CHEMICAL PROPERTIES

Typical physical properties are given below. Consult Product Data Sheet for specific details.

APPEARANCE: Liquid

COLOR: Clear (May Be Dyed)

ODOR: Gasoline

ODOR THRESHOLD-ppm: NE

pH: NA

BOILING POINT C(F): > 20(68)

MELTING POINT C(F): NA

FLASH POINT C(F): < -40(-40) (ASTM D-56)

FLAMMABILITY (solids): NE

AUTO FLAMMABILITY C(F): NE

EXPLOSIVE PROPERTIES: NA

OXIDIZING PROPERTIES: NA

VAPOR PRESSURE-mmHg 20 C: > 200.0

VAPOR DENSITY: 3.0

EVAPORATION RATE: NE

RELATIVE DENSITY, 15/4 C: 0.79

SOLUBILITY IN WATER: Negligible

PARTITION COEFFICIENT: > 1

VISCOSITY AT 40 C, cSt: < 1.0

VISCOSITY AT 100 C, cSt: NA

POUR POINT C(F): NA

FREEZING POINT C(F): NE

VOLATILE ORGANIC COMPOUND: NE

DMSO EXTRACT, IP-346 (WT.%): NA

NA=NOT APPLICABLE NE=NOT ESTABLISHED D=DECOMPOSES

FOR FURTHER TECHNICAL INFORMATION, CONTACT YOUR MARKETING REPRESENTATIVE

10. STABILITY AND REACTIVITY

STABILITY (THERMAL, LIGHT, ETC.): Stable.

CONDITIONS TO AVOID: Heat, sparks, flame and build up of static electricity.

INCOMPATIBILITY (MATERIALS TO AVOID): Halogens, strong acids, alkalies, and oxidizers.

HAZARDOUS DECOMPOSITION PRODUCTS: Product does not decompose at ambient temperatures.

HAZARDOUS POLYMERIZATION: Will not occur.

11. TOXICOLOGICAL DATA

---ACUTE TOXICOLOGY---

ORAL TOXICITY (RATS): Practically non-toxic (LD50: greater than 2000 mg/kg). ---Based on testing of similar products and/or the components.

DERMAL TOXICITY (RABBITS): Practically non-toxic (LD50: greater than 2000 mg/kg). ---Based on testing of similar products and/or the components.

INHALATION TOXICITY (RATS): Practically non-toxic (LC50: greater than 5 mg/l). ---Based on testing of similar products and/or the components.

EYE IRRITATION (RABBITS): Practically non-irritating. (Draize score: greater than 6 but 15 or less). ---Based on testing of similar products and/or the components.

SKIN IRRITATION (RABBITS): Irritant. (Primary Irritation Index: 3 or greater but less than 5). ---Based on testing of similar products and/or the components.

OTHER ACUTE TOXICITY DATA: Inhalation of high concentrations of vapors or aerosols/mists, especially deliberate or abuse exposure, may cause respiratory system irritation and damage. These exposures may also result in central nervous system depression and damage, possibly leading to death. Prolonged skin contact with gasoline may cause severe skin irritation similar to a chemical burn. The above effects, which may result from the whole gasoline or some of the gasoline components, are well documented in the medical literature.

HAZARDS OF COMBUSTION PRODUCTS: Exposure to high concentrations of carbon monoxide can cause loss of consciousness, heart damage, brain damage and death.

---SUBCHRONIC TOXICOLOGY (SUMMARY)---

Two dermal studies resulted in significant irritation in rabbits but no significant systemic toxicity. 90-day inhalation exposures (approximately 1500 ppm vapor) in rats and monkeys produced light hydrocarbon nephropathy in male rats, but no other significant systemic toxicity.

---NEUROTOXICOLOGY (SUMMARY)---

Exposure to high concentrations of unleaded gasoline in rodents caused reversible central nervous system depression, however, no persistent neurotoxic effects were observed in subchronic inhalation studies of

gasoline blending streams. No neurotoxic effects, as measured by a functional observation battery, motor activity, and neuropathology, were observed in rats exposed to light alkylate naphtha for 13 weeks at concentrations up to 6600 ppm. The medical literature clearly documents neurotoxic effects in humans from abusive gasoline inhalation (sniffing).

---REPRODUCTIVE TOXICOLOGY (SUMMARY)---

Two separate inhalation teratology studies of unleaded gasoline vapor at exposures up to 1600 ppm and 9000 ppm for 6 hours/day on days 6-20 did not result in any significant developmental effects in rats. No significant effects were observed in the mothers or offspring. A two-generation inhalation reproductive study (CONCAWE) of unleaded gasoline showed no reproductive or developmental effects in rats exposed to concentrations up to 20,000 mg/m³ (approx. 8000 ppm).

---CHRONIC TOXICOLOGY (SUMMARY)---

A lifetime mouse skin painting study of unleaded gasoline applied at 50 microliters, three times weekly, resulted in some severe skin irritation and changes, but no statistically significant increase in skin cancer or cancer to any other organ. A lifetime inhalation study of vaporized unleaded gasoline at up to 2000 ppm caused liver tumors in female mice and increased kidney tumors in male rats. The kidney tumors resulted from the formation of a compound unique to male rats, and are not considered relevant to humans. The U.S. EPA Risk Assessment Forum concluded that the male rat kidney tumor results are not relevant for human risk assessment. The implications for the female mice liver tumor data for human risk assessment have not been fully determined. Multiple short-term cancer predicative tests (Ames Test, etc.) have routinely been negative (no cancer or mutagenic potential) for unleaded gasoline.

---SENSITIZATION (SUMMARY)---

Unleaded gasoline was not a skin sensitizer in tests in a Buehler Guinea Pig Sensitization Assay.

---OTHER TOXICOLOGY DATA---

Gasoline and Refinery Streams: Isolated constituents of gasoline may display these or other potential hazards in laboratory tests. Gasoline consists of a complex blend of petroleum/processing derived paraffinic, olefinic, naphthenic and aromatic hydrocarbons which include up to 5% benzene (with 1-2 % typical in the U.S.), n-hexane, mixed xylenes, toluene, ethylbenzene and trimethyl benzene. Benzene has also caused damage to the fetus of test animals in developmental studies. Benzene has tested positive (mutagenic) in a number of short-term cancer/mutation predicative tests. Repeated exposures to low levels of benzene (50-500 ppm) have been reported to result in blood abnormalities including anemia and, in rare cases, leukemia in both animals and humans. Prolonged exposure to n-hexane may result in a condition known as peripheral neuropathy. This is nervous system damage and is characterized by numbness of the extremities and, in extreme cases, paralysis. This product contains ethylbenzene. The International Agency for Research on Cancer (IARC) has evaluated ethylbenzene and classified it as possibly carcinogenic to humans (Group 2B) based on sufficient evidence for carcinogenicity in experimental animals, but inadequate evidence for cancer in exposed humans. Methyl Tertiary Butyl Ether (MTBE) was

tested for carcinogenicity, neurotoxicity, chronic, reproductive, and developmental toxicity. The NOAEL for all end points evaluated in three animal species was 400 ppm or greater. An increase in kidney tumors/damage and liver tumors was observed in animals exposed to high concentrations of MTBE. Some embryo/fetal toxicity and birth defects were observed in the offspring of pregnant mice exposed to maternally toxic doses of MTBE, however the offspring of exposed pregnant rabbits were unaffected. The significance of the animal findings at high exposures are not believed to be directly related to potential human health hazards in the workplace.

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL FATE AND EFFECTS:

In the absence of specific environmental data for this product, this assessment is based on information for representative substances.

ECOTOXICITY: Based on test results for similar products, this substance may be toxic to aquatic organisms such as algae and daphnia (EL50/IrL50 = 1-10 mg/L). This substance has also been shown to be toxic to fish (LL50 = 1-10 mg/L).

MOBILITY: Dissolution of the higher molecular weight hydrocarbon components in water will be limited, but losses through sediment adsorption may be significant.

PERSISTENCE AND DEGRADABILITY: The majority of the components in this product are expected to be inherently biodegradable. When released into the environment, some of the constituents of gasoline will volatilize and be photodegraded in the atmosphere. The less volatile, more water-soluble components which are aromatic hydrocarbons will also undergo aqueous photodegradation.

BIOACCUMULATIVE POTENTIAL: Not established.

13. DISPOSAL CONSIDERATIONS

WASTE DISPOSAL: Product is suitable for burning for fuel value in compliance with applicable laws and regulations and consideration of product characteristics at time of disposal.

RCRA INFORMATION: Disposal of unused product may be subject to RCRA regulations (40 CFR 261). Disposal of the used product may also be regulated due to ignitability, corrosivity, reactivity, or toxicity as determined by the Toxicity Characteristic Leaching Procedure (TCLP).

BENZENE: 2.0000 PCT (TCLP)
FLASH: < -40(-40) C(F)

14. TRANSPORT INFORMATION

USA DOT:

SHIPPING NAME: Gasoline
HAZARD CLASS & DIV: 3
ID NUMBER: UN1203
ERG NUMBER: 128
PACKING GROUP: PG II
STCC: NE
DANGEROUS WHEN WET: No
POISON: No
LABEL(s): Flammable Liquid
PLACARD(s): Flammable
PRODUCT RQ: NA
MARPOL III STATUS: NA

RID/ADR:

HAZARD CLASS: 3
PACKING GROUP: II
LABEL: 3
DANGER NUMBER: 33
UN NUMBER: 1203
SHIPPING NAME: Gasoline
REMARKS: NA

IMO:

HAZARD CLASS & DIV: 3
UN NUMBER: 1203
PACKING GROUP: PG II
SHIPPING NAME: Gasoline
LABEL(s): Flammable Liquid
MARPOL III STATUS: NA

ICAO/IATA:

HAZARD CLASS & DIV: 3
ID/UN Number: 1203
PACKING GROUP: PG II
SHIPPING NAME: Gasoline
SUBSIDIARY RISK: NA
LABEL(s): Flammable Liquid

STATIC ACCUMULATOR (50 picosiemens or less): YES

15. REGULATORY INFORMATION

US OSHA HAZARD COMMUNICATION STANDARD: Product assessed in accordance with OSHA 29 CFR 1910.1200 and determined to be hazardous.

EU Labeling: Product is dangerous as defined by the European Union Dangerous Substances/Preparations Directives.

Symbol: F+ T N Extremely flammable, Toxic, Dangerous for the environment.

Risk Phrase(s): R12-45-38-65-67-51/53.
Extremely flammable. May cause cancer. Irritating to skin.
Harmful: may cause lung damage if swallowed. Vapors may cause

drowsiness and dizziness. Toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrase(s): S16-53-45-2-23-24-29-43-62.

Keep away from sources of ignition - No smoking. Avoid exposure - obtain special instructions before use. In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible). Keep out of the reach of children. Do not breathe vapor. Avoid contact with skin. Do not empty into drains. In case of fire use foam/drypowder/CO2. If swallowed, do not induce vomiting: seek medical advice immediately and show this container or label.

Contains: Low Boiling Point Naphtha.

Governmental Inventory Status: All components comply with TSCA, EINECS/ELINCS, AICS, METI, DSL, KOREA, and PHILIPPINES.

U.S. Superfund Amendments and Reauthorization Act (SARA) Title III: This product contains no "EXTREMELY HAZARDOUS SUBSTANCES".

SARA (311/312) REPORTABLE HAZARD CATEGORIES:
FIRE CHRONIC ACUTE

This product contains the following SARA (313) Toxic Release Chemicals:

CHEMICAL NAME	CAS NUMBER	CONC.
BENZENE (COMPONENT ANALYSIS)	71-43-2	2%
PSEUDOCUMENE (1,2, 4-TRIMETHYLBENZENE) (COMPONENT ANALYSIS)	95-63-6	3%
ETHYL BENZENE (COMPONENT ANALYSIS)	100-41-4	3%
TOLUENE (COMPONENT ANALYSIS)	108-88-3	6%
N-HEXANE (COMPONENT ANALYSIS)	110-54-3	3%
XYLENES (COMPONENT ANALYSIS)	1330-20-7	10%
METHYL-TERT-BUTYL ETHER (COMPONENT ANALYSIS)	1634-04-4	<16%

The following product ingredients are cited on the lists below:

CHEMICAL NAME	CAS NUMBER	LIST CITATIONS *
GASOLINE		1, 8, 19, 20, 21, 23, 25
ETHYL ALCOHOL (COMPONENT ANALYSIS)	64-17-5	1, 6, 10, 18, 19, 20, 21, 23, 25, 26
BENZENE (COMPONENT ANALYSIS) (2.00%)	71-43-2	1, 2, 4, 6, 9, 10, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25,

NAPHTHALENE (COMPONENT ANALYSIS) (0.50%)	91-20-3	26 16, 22
PSEUDOCUMENE (1,2, 4-TRIMETHYLBENZENE) (COMPONENT ANALYSIS)	95-63-6	1, 20, 24, 25
ETHYL BENZENE (COMPONENT ANALYSIS)	100-41-4	1, 8, 10, 18, 19, 20, 21, 23, 24, 25, 26
TOLUENE (COMPONENT ANALYSIS) (6.00%)	108-88-3	1, 10, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26
N-HEXANE (COMPONENT ANALYSIS)	110-54-3	1, 10, 18, 19, 20, 21, 23, 24, 25, 26
XYLENES (COMPONENT ANALYSIS) (10.00%)	1330-20-7	1, 10, 18, 19, 20, 21, 22, 23, 24, 25, 26
METHYL-TERT-BUTYL ETHER (COMPONENT ANALYSIS)	1634-04-4	1, 21, 24, 25
TRIMETHYL BENZENE (COMPONENT ANALYSIS)	25551-13-7	1, 10, 18, 19, 20, 21, 23, 25, 26

--- REGULATORY LISTS SEARCHED ---

1=ACGIH ALL	6=IARC 1	11=TSCA 4	16=CA P65 CARC	21=LA RTK
2=ACGIH A1	7=IARC 2A	12=TSCA 5a2	17=CA P65 REPRO	22=MI 293
3=ACGIH A2	8=IARC 2B	13=TSCA 5e	18=CA RTK	23=MN RTK
4=NTP CARC	9=OSHA CARC	14=TSCA 6	19=FL RTK	24=NJ RTK
5=NTP SUS	10=OSHA Z	15=TSCA 12b	20=IL RTK	25=PA RTK
				26=RI RTK

* EPA recently added new chemical substances to its TSCA Section 4 test rules. Please contact the supplier to confirm whether the ingredients in this product currently appear on a TSCA 4 or TSCA 12b list.

Code key: CARC=Carcinogen; SUS=Suspected Carcinogen; REPRO=Reproductive

16. OTHER INFORMATION

USE: UNLEADED MOTOR FUEL

NOTE: PRODUCTS OF EXXON MOBIL CORPORATION AND ITS AFFILIATED COMPANIES ARE NOT FORMULATED TO CONTAIN PCBS.

Health studies have shown that many hydrocarbons pose potential human health risks which may vary from person to person. Information provided on this MSDS reflects intended use. This product should not be used for other applications. In any case, the following advice should be considered:

INJECTION INJURY WARNING: If product is injected into or under the skin, or into any part of the body, regardless of the appearance of the wound or its size, the individual should be evaluated immediately by a physician as a surgical emergency. Even though initial symptoms from high pressure injection may be minimal or absent, early surgical treatment within the first few hours may significantly reduce the

ultimate extent of injury.

Precautionary Label Text:

CONTAINS GASOLINE, BENZENE, AND ETHYLBENZENE

DANGER!

EXTREMELY FLAMMABLE LIQUID AND VAPOR. VAPOR MAY CAUSE FLASH FIRE. CAUSES SKIN IRRITATION. RESPIRATORY IRRITATION, HEADACHE, DIZZINESS, NAUSEA, LOSS OF CONSCIOUSNESS, AND IN CASES OF EXTREME EXPOSURE, POSSIBLY DEATH. LOW VISCOSITY MATERIAL-IF SWALLOWED, MAY BE ASPIRATED AND CAN CAUSE SERIOUS OR FATAL LUNG DAMAGE.

OVEREXPOSURE TO BENZENE MAY RESULT IN CANCER, BLOOD DISORDERS, AND DAMAGE TO THE BONE MARROW. LONG-TERM EXPOSURE TO GASOLINE VAPOR HAS CAUSED KIDNEY AND LIVER CANCER IN LABORATORY ANIMALS, BLOOD EFFECTS, AND NERVOUS SYSTEM DAMAGE.

Keep away from heat, sparks, and flame. Avoid all personal contact. Avoid prolonged breathing of vapor. Use with adequate ventilation. Keep container closed. Approved portable containers must be properly grounded when transferring fuel. For use as a motor fuel only. Misuse of gasoline may cause serious injury or illness. Never siphon by mouth. Not to be used as a solvent or skin cleaning agent.

FIRST AID: In case of contact, wash skin with soap and water. Immediately remove contaminated clothing, including shoes. Destroy or wash clothing before reuse. If swallowed, seek immediate medical attention. Do not induce vomiting. Only induce vomiting at the instruction of a physician.

This warning is given to comply with California Health and Safety Code 25249.6 and does not constitute an admission or a waiver of rights. This product contains a chemical known to the State of California to cause cancer, birth defects, or other reproductive harm. Chemicals known to the State of California to cause cancer, birth defects, or other reproductive harm are created by the combustion of this product. Refer to product Material Safety Data Sheet for further safety and health information.

For Internal Use Only: MHC: 1* 1* 1* 1* 2*, MPPEC: CF, TRN: 35014-00,
REQ: US - MARKETING, SAFE USE: G
EHS Approval Date: 03APR2003

Information given herein is offered in good faith as accurate, but without guarantee. Conditions of use and suitability of the product for particular uses are beyond our control; all risks of use of the product are therefore assumed by the user and WE EXPRESSLY DISCLAIM ALL WARRANTIES OF EVERY KIND AND NATURE, INCLUDING WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE IN RESPECT TO THE USE OR SUITABILITY OF THE PRODUCT. Nothing is intended as a recommendation for uses which infringe valid patents or as extending license under valid patents. Appropriate warnings and safe handling procedures should be provided to handlers and users. Alteration of this document is strictly prohibited. Except to the extent required by law, republication or retransmission of this document, in whole or in part, is not permitted. Exxon Mobil Corporation and its affiliated companies assume no responsibility for accuracy of information unless the document is the most current available from an official ExxonMobil distribution system. Exxon Mobil Corporation and its affiliated companies neither represent nor warrant that the format, content or product formulas contained in this document comply with the laws of any other country except the United States of America.

Prepared by: ExxonMobil Oil Corporation
Environmental Health and Safety Department, Clinton, USA

Lube #305

Material Safety Data Sheet

Chevron Ultra-Duty Grease EP

MSDS: 6790

Revision #: 3 Revision Date: 11/09/00

Click here to search the [product data sheet](#) database

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

CHEVRON Ultra-Duty Grease EP

PRODUCT NUMBER(S): CPS238011 CPS238012 CPS238013

SYNONYM: CHEVRON Ultra-Duty Grease EP NLGI 0

CHEVRON Ultra-Duty Grease EP NLGI 1

CHEVRON Ultra-Duty Grease EP NLGI 2

COMPANY IDENTIFICATION EMERGENCY TELEPHONE NUMBERS

Chevron Products Company HEALTH (24 hr): (800)231-0623 or
Lubricants and Specialty Products (510)231-0623 (International)
6001 Bollinger Canyon Rd., T3325/B10 TRANSPORTATION (24 hr): CHEMTREC
San Ramon, CA 94583 (800)424-9300 or (703)527-3887
www.chevron-lubricants.com Emergency Information Centers
are located in U.S.A.
Int'l collect calls accepted

PRODUCT INFORMATION: MSDS Request: (800)414-6737 email: lubemsds@chevron.com
Environmental, Safety, & Health Info: (925) 842-5535
Product Information: (800) 582-3835
SPECIAL NOTES: This MSDS is for the entire line of CHEVRON
Ultra-Duty Grease EP products.

2. COMPOSITION/INFORMATION ON INGREDIENTS

100.0 % CHEVRON Ultra-Duty Grease EP

CONTAINING

COMPONENTS AMOUNT LIMIT/QTY AGENCY/TYPE

HYDROTREATED DIST., HVY NAPHTH
Chemical Name: DISTILLATES, HYDROTREATED HEAVY NAPHTHENIC
CAS64742525 > 70.00% 5 mg/m3 (mist) ACGIH TWA
10 mg/m3 (mist) ACGIH STEL
5 mg/m3 (mist) OSHA PEL

BUTENE, HOMOPOLYMER

Chemical Name: POLYBUTENE
CAS9003296 < 5.00% NONE NA

LITHIUM BASE THICKENERS
< 10.00%

ADDITIVES INCLUDING THE FOLLOWING
< 15.00%

ZINC COMPOUNDS
< 5.00%

ANTIMONY COMPOUND
ANTIMONY DIALKYL DITHIOCARBAMATE
< 0.50% 0.5 mg/m³ ACGIH TWA

COMPOSITION COMMENT:

All the components of this material are on the Toxic Substances Control Act Chemical Substances Inventory.

This product fits the ACGIH definition for mineral oil mist. The ACGIH TLV is 5 mg/m³, the OSHA PEL is 5 mg/m³.

3. HAZARDS IDENTIFICATION

IMMEDIATE HEALTH EFFECTS

EYE:

Not expected to cause prolonged or significant eye irritation.

SKIN:

Contact with the skin is not expected to cause prolonged or significant irritation. Not expected to be harmful to internal organs if absorbed through the skin. High-Pressure Equipment Information: Accidental high-velocity injection under the skin of materials of this type may result in serious injury. Seek medical attention at once should an accident like this occur. The initial wound at the injection site may not appear to be serious at first; but, if left untreated, could result in disfigurement or amputation of the affected part.

INGESTION:

Not expected to be harmful if swallowed.

INHALATION:

Contains a petroleum-based mineral oil. May cause respiratory irritation or other pulmonary effects following prolonged or repeated inhalation of oil mist at airborne levels above the recommended mineral oil mist exposure limit.

4. FIRST AID MEASURES

EYE:

No specific first aid measures are required because this material is not expected to cause eye irritation. As a precaution remove contact lenses, if worn, and flush eyes with water.

SKIN:

No specific first aid measures are required because this material is not expected to be harmful if it contacts the skin. As a precaution, remove clothing and shoes if contaminated. Use a waterless hand cleaner, mineral oil, or petroleum jelly to remove the material. Then wash skin with soap and water. Wash or clean contaminated clothing and shoes before reuse.

INGESTION:

No specific first aid measures are required because this material is not expected to be harmful if swallowed. Do not induce vomiting. As a precaution, give the person a glass of water or milk to drink and get medical advice. Never give anything by mouth to an unconscious person.

INHALATION:

If exposed to excessive levels of material in the air, move the exposed person to fresh air. Get medical attention if coughing or respiratory discomfort occurs.

NOTE TO PHYSICIANS:

In an accident involving high-pressure equipment, this product may be injected under the skin. Such an accident may result in a small, sometimes bloodless, puncture wound. However, because of its driving force, material injected into a fingertip can be deposited into the palm of the hand. Within 24 hours, there is usually a great deal of swelling, discoloration, and intense throbbing pain. Immediate treatment at a surgical emergency center is recommended.

5. FIRE FIGHTING MEASURES

FIRE CLASSIFICATION:

Classification (29 CFR 1910.1200): Not classified by OSHA as flammable or combustible.

FLAMMABLE PROPERTIES:

FLASH POINT: 525F (274C)

AUTOIGNITION: NDA

FLAMMABILITY LIMITS (% by volume in air): Lower: NA Upper: NA

EXTINGUISHING MEDIA:

CO₂, Dry Chemical, Foam, Water Fog

NFPA RATINGS: Health 1; Flammability 1; Reactivity 0.

FIRE FIGHTING INSTRUCTIONS:

This material will burn although it is not easily ignited. For fires involving this material, do not enter any enclosed or confined fire space without proper protective equipment, including self-contained breathing apparatus.

COMBUSTION PRODUCTS:

Normal combustion forms carbon dioxide and water vapor and may produce oxides of sulfur, nitrogen, phosphorus, and antimony. Normal combustion forms oxides of zinc. Incomplete combustion can produce carbon monoxide.

6. ACCIDENTAL RELEASE MEASURES

CHEMTREC EMERGENCY NUMBER (24 hr): (800)424-9300 or (703)527-3887

International Collect Calls Accepted

ACCIDENTAL RELEASE MEASURES:

Clean up spills immediately, observing precautions in Exposure Controls/Personal Protection section.

7. HANDLING AND STORAGE

Container is not designed to contain pressure. Do not use pressure to empty container or it may rupture with explosive force. Empty containers retain product residue (solid, liquid, and/or vapor) and can be dangerous. Do not pressurize, cut, weld, braze, solder, drill, grind, or expose such containers to heat, flame, sparks, static electricity, or other sources of ignition. They may explode and cause injury or death. Empty containers should be completely drained, properly closed, and promptly returned to a drum reconditioner, or properly disposed of. Avoid contaminating soil or releasing this material into sewage and drainage systems and bodies of water.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

GENERAL CONSIDERATIONS:

Consider the potential hazards of this material (see Section 3), applicable exposure limits, job activities, and other substances in the work place when designing engineering controls and selecting personal protective equipment. If engineering controls or work practices are not adequate to prevent exposure to harmful levels of this material, the personal protective equipment listed below is recommended. The user should read and understand all instructions and limitations supplied with the equipment since protection is usually provided for a limited time or under certain circumstances.

ENGINEERING CONTROLS

Use in a well-ventilated area. If user operations generate an oil mist, use process enclosures, local exhaust ventilation, or other engineering controls to control airborne levels below the recommended mineral oil mist exposure limits.

PERSONAL PROTECTIVE EQUIPMENT

EYE/FACE PROTECTION:

No special eye protection is normally required.

SKIN PROTECTION:

No special protective clothing is normally necessary.

RESPIRATORY PROTECTION:

No respiratory protection is normally required. If user operations generate an oil mist, determine if airborne concentrations are below the recommended mineral oil mist exposure limits. If not wear a NIOSH approved respirator that provides adequate protection from measured concentrations of this material. Use the following elements for air-purifying respirators: particulate.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL DESCRIPTION:

Red grease.

pH: NA

VAPOR PRESSURE: <0.01 mm Hg at 100F

VAPOR DENSITY

(AIR=1): Heavier than air.

BOILING POINT: >500F (>260C)

FREEZING POINT: NA

MELTING POINT: NA

SOLUBILITY: Soluble in hydrocarbon solvents; insoluble in water.

SPECIFIC GRAVITY: NDA

DENSITY: NDA

VISCOSITY: 18 - 22 cSt @ 100C (Min.)

10. STABILITY AND REACTIVITY

HAZARDOUS DECOMPOSITION PRODUCTS:

No data available.

CHEMICAL STABILITY:

Stable.

CONDITIONS TO AVOID:

No data available.

INCOMPATIBILITY WITH OTHER MATERIALS:

May react with strong oxidizing agents, such as chlorates, nitrates, peroxides, etc.

HAZARDOUS POLYMERIZATION:

Polymerization will not occur.

11. TOXICOLOGICAL INFORMATION

EYE EFFECTS:

The mean 24-hour Draize eye irritation score in rabbits is 2.3/110.

SKIN EFFECTS:

For a 4-hour exposure, the Primary Irritation Index (PII) in rabbits is: 0.6/8.0. The acute dermal LD50 in rabbits is > 2.0 g/kg.

ACUTE ORAL EFFECTS:

No product toxicology data available. The hazard evaluation was based on data from similar materials.

ACUTE INHALATION EFFECTS:

No product toxicology data available. The hazard evaluation was based on data from similar materials.

ADDITIONAL TOXICOLOGY INFORMATION:

This product contains petroleum base oils which may be refined by various processes including severe solvent extraction, severe hydrocracking, or severe hydrotreating. None of the oils requires a cancer warning under the OSHA Hazard Communication Standard (29 CFR 1910.1200). These oils have not been listed in the National Toxicology Program (NTP) Annual Report nor have they been classified by the International Agency for Research on Cancer (IARC) as; carcinogenic to humans (Group 1), probably carcinogenic to humans (Group 2A), or possibly carcinogenic to humans (Group 2B).

This material contains antimony. Dizziness and respiratory problems such as pneumonitis and pneumoconiosis have been associated with exposure to antimony.

12. ECOLOGICAL INFORMATION

ECOTOXICITY:

The toxicity of this material to aquatic organisms has not been evaluated. Consequently, this material should be kept out of sewage and drainage systems and all bodies of water.

ENVIRONMENTAL FATE:

This material is not expected to be readily biodegradable.

13. DISPOSAL CONSIDERATIONS

Oil collection services are available for used oil recycling or disposal. Place contaminated materials in containers and dispose of in a manner consistent with applicable regulations. Contact your sales representative or local environmental or health authorities for approved disposal or recycling methods.

14. TRANSPORT INFORMATION

The description shown may not apply to all shipping situations. Consult 49CFR, or appropriate Dangerous Goods Regulations, for additional description requirements (e.g., technical name) and mode-specific or quantity-specific shipping requirements.

DOT SHIPPING NAME: NONE

DOT HAZARD CLASS: NONE

DOT IDENTIFICATION NUMBER: NONE

DOT PACKING GROUP: N/A

ADDITIONAL INFO: Petroleum Lubricating Grease - Not hazardous by US DOT.

ADR/RID Hazard Class - Not applicable

15. REGULATORY INFORMATION

SARA 311 CATEGORIES: 1. Immediate (Acute) Health Effects: NO

2. Delayed (Chronic) Health Effects: NO

3. Fire Hazard: NO

4. Sudden Release of Pressure Hazard: NO

5. Reactivity Hazard: NO

REGULATORY LISTS SEARCHED:

01=SARA 313 11=NJ RTK 22=TSCA Sect 5(a) (2)

02=MASS RTK 12=CERCLA 302.4 23=TSCA Sect 6

03=NTP Carcinogen 13=MN RTK 24=TSCA Sect 12(b)

04=CA Prop 65-Carcin 14=ACGIH TWA 25=TSCA Sect 8(a)

05=CA Prop 65-Repro Tox 15=ACGIH STEL 26=TSCA Sect 8(d)

06=IARC Group 1 16=ACGIH Calc TLV 27=TSCA Sect 4(a)

07=IARC Group 2A 17=OSHA PEL 28=Canadian WHMIS

08=IARC Group 2B 18=DOT Marine Pollutant 29=OSHA CEILING
09=SARA 302/304 19=Chevron TWA 30=Chevron STEL
10=PA RTK 20=EPA Carcinogen

The following components of this material are found on the regulatory lists indicated.

DISTILLATES, HYDROTREATED HEAVY NAPHTHENIC

is found on lists: 14,15,17,

ANTIMONY DIALKYL DITHIOCARBAMATE

is found on lists: 01,11,14,28,

ZINC COMPOUNDS

is found on lists: 01,10,11,

NEW JERSEY RTK CLASSIFICATION:

Under the New Jersey Right-to-Know Act L. 1983 Chapter 315 N.J.S.A.

34:5A-1 et. seq., the product is to be identified as follows:

Petroleum Oil (Grease)

WHMIS CLASSIFICATION:

This product is not considered a controlled product according to the criteria of the Canadian Controlled Products Regulations.

16. OTHER INFORMATION

NFPA RATINGS: Health 1; Flammability 1; Reactivity 0;

HMIS RATINGS: Health 1; Flammability 1; Reactivity 0;

(0-Least, 1-Slight, 2-Moderate, 3-High, 4-Extreme, PPE:- Personal Protection Equipment Index recommendation, *- Chronic Effect Indicator). These values are obtained using the guidelines or published evaluations prepared by the National Fire Protection Association (NFPA) or the National Paint and Coating Association (for HMIS ratings).

REVISION STATEMENT:

This revision updates Section 9 (Physical and Chemical Properties) and Section 15 (Regulatory Information).

ABBREVIATIONS THAT MAY HAVE BEEN USED IN THIS DOCUMENT:

TLV - Threshold Limit Value TWA - Time Weighted Average

STEL - Short-term Exposure Limit TPQ - Threshold Planning Quantity

RQ - Reportable Quantity PEL - Permissible Exposure Limit

C - Ceiling Limit CAS - Chemical Abstract Service Number

A1-5 - Appendix A Categories () - Change Has Been Proposed

NDA - No Data Available NA - Not Applicable

Prepared according to the OSHA Hazard Communication Standard (29 CFR 1910.1200) and the ANSI MSDS Standard (Z400.1) by the Toxicology and Health Risk Assessment Unit, CRTc, P.O. Box 1627, Richmond, CA 94804

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.

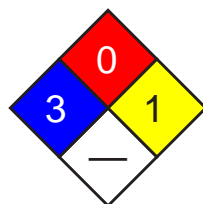
IDLH Level

50 ppm.

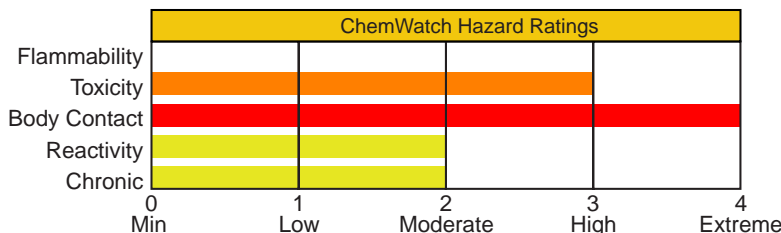
EU OEL

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.

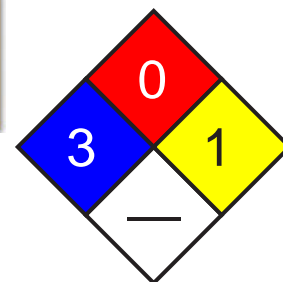
Fire-Fighting Instructions: Contact fire department and tell them location and nature of hazard.

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.

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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.

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

See
DOT
ERG

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 alkalis, 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.

COOK CHEMICAL CONTROL PERMIT

Page 1

ical Permit Number : 0713 Revision Number : 01
or Function Category: SOLVENT Revision Date : 04/08/93
Product Name : KEROSENE BURNER FUEL*
Manufacturer : GENIUM PUBLISHING CORPORATION
Intended Use : KEROSENE

Approved Use Category(ies):
 Category III (Red)

NFPA Label (0=Low, 4=High):
F
[2]
H [0] [0] R
[]
S

Approved User Department(s):

Construction Maintenance Plant Engineering

Storage (Minimum Requirements):

Waste Disposal:

Minimize waste by using all product
 Contact Environmental for disposal
 Hazardous waste
 Trash empty container

Industrial Hygiene:

No additional I.H. concerns, follow MSDS guidelines

Auxiliary Building Use:

Potential MIXED WASTE
 Only take the amount of material needed to complete the task.

* SECTION I *

MSDS NUMBER: 0713
PART NUMBER:
MSDS CODE: R
MSDS OTHER CODE ..: SOLVENT
SYNONYMS: KEROSENE BURNER FUEL
 COAL OIL
 RANGE OIL
 ASTM D3699
 CAS #008 008 206

MANUFACTURER: GENIUM PUBLISHING CORPORATION
DIVISION:
MFG PART NUMBER ..:
VENDOR:
EMERGENCY PHONE ..:
OTHER CALLS: 518-377-8855
ADDRESS: 1145 CATALYN STREET
CITY: SCHENECTADY STATE ..:NY ZIP ..:12303-1836
MSDS PREPARED BY ..:
DATE PREPARED: 11/01/82

***** ADDITIONAL INFORMATION *****

DESCRIPTION: REFINED PETROLEUM MIDDLE DISTILLATE CONSISTING OF HYDROCARBONS
 HAVING AP. 10-16 CARBON ATOMS FOR USE IN BURNERS AND WICK-FED LAMPS.
MANUFACTURER: AVAILABLE FROM MANY SUPPLIERS.

* THE SPELLING "KEROSINE" IS PREFERRED BY ASTM AND ACS. SEE ALSO KEROSENE
SOLVENT, MSDS #387.

NO. 488

APPROVALS: MIS/CRD: J.M. NIELSON
INDUST. HYGIENE/SAFETY: D/W 9-29-82
MEDICAL REVIEW: 3 OCTOBER 1982

* SECTION II - HAZARDOUS INGREDIENTS/IDENTITY INFORMATION *

TRADE NAME : KEROSENE BURNER FUEL*

INGREDIENT NAME	CAS	OSHA PEL	ACGIH TLV	OTHER	%
HYDROCARBON MIXTURES (VARIABLE) CONSISTING OF PARAFFINS (MAINLY), NAPHTHENES, OLEFINS AND AROMATICS			NO TLV ESTABLISHED		>98

***** ADDITIONAL INFORMATION *****

INGREDIENTS AND HAZARDS	%	HAZARD DATA
HYDROCARBON MIXTURES (VARIABLE) CONSISTING OF PARAFFINS (MAINLY), NAPHTHENES, OLEFINS AND AROMATICS	>98	NO TLV ESTABLISHED*
TOTAL SULFUR CONTENT, MAX.		
KEROSENE NO. 1-K LOW SULFUR GRADE	0.04	
KEROSENE NO. 2-K REGULAR GRADE (FLUE CONNECTION REQUIRED FOR BURNERS FOR 2-K USE.)	0.30	
WAPTAN SULFUR, MAX.	30 PPM	

EXPOSURE LIMITS DEPEND ON COMPONENTS (VARIABLE); GET SUPPLIER RECOMMENDATION FOR PRODUCT. NIOSH (1977) RECOMMENDED 10-HOUR TWA OF 100 MG/M3 OR ABOUT 14 PPM FOR KEROSENE WITH B.P. 347-617 F. RAT, ORAL LDLO 28 G/KG

* SECTION III - CHEMICAL CHARACTERISTICS *

BOILING POINT	MELTING POINT	FREEZING POINT	SPECIFIC GRAVITY (H2O = 1)
175-300 (DEG C AT 1 ATM)		BELOW -30 (DEG C)	CA 0.8
PERCENT VOLATILE by VOLUME	THEORETICAL VOC CONTENT (percent of WEIGHT)	WEIGHT PER GALLON	

pH:
Conc:

VAPOR PRESSURE (mm of Hg) CA 5 (AT 20 C)	VAPOR DENSITY (Air = 1) CA 4.5	DENSITY	EVAPORATION RATE Basis ()=1 Rate
--	--------------------------------------	---------	---

SOLUBILITY IN WATER
INSOLUBLE

REACTIVITY IN WATER

APPEARANCE AND ODOR:

PALE YELLOW OR WATER-WHITE, MOBILE, OILY LIQUID; MILD PETROLEUM ODOR.

***** ADDITIONAL INFORMATION *****

VISCOSITY AT 40 C, CST: 1.0-1.9

* SECTION IV - FIRE AND EXPLOSION HAZARD DATA *

FLASH POINT 100F (MIN)	METHOD CC	FLAMMABLE LIMITS IN AIR (%) UPPER = CA 6 LOWER = CA 0.8	AUTOIGNITION TEMPERATURE >410 F
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NFPA CODES: HEALTH: 0
FLAMMABILITY ...: 2
REACTIVITY: 0
OTHER:

HAZS CODES: HEALTH:
FLAMMABILITY ...:
REACTIVITY:
PROTECTION

EXTINGUISHER MEDIA: DRY CHEMICAL, CARBON DIOXIDE, FOAM, WATER SPRAY OR FOG.
USE A SMOTHERING TECHNIQUE FOR EXTINGUISHING FIRE. A FORCED STREAM OF WATER COULD SCATTER FLAMES OF BURNING KEROSENE. FLAMMABLE VAPORS WILL BE EMITTED FROM HEATED LIQUID. USE A WATER SPRAY (CAUTION!) TO COOL FIRE-EXPOSED CONTAINERS TO PREVENT VIOLENT RUPTURE. WATER RUNOFF TO SEWER MAY CARRY COMBUSTIBLE KEROSENE AND CREATE A FIRE OR EXPLOSION HAZARD. FIREFIGHTERS SHOULD USE SELF-CONTAINED BREATHING APPARATUS AND PROTECTIVE CLOTHING.

SPECIAL FIRE FIGHTING PROCEDURES:
SEE "EXTINGUISHING MEDIA" HEREIN

UNUSUAL FIRE AND EXPLOSION HAZARDS:

***** ADDITIONAL INFORMATION *****

COOK MANUFACTURED NFPA

* SECTION V - REACTIVITY DATA *

IS THIS CHEMICAL STABLE UNDER NORMAL CONDITIONS OF HANDLING/STORAGE (Y/N)? Y

CONDITIONS TO AVOID (REGARDING STABILITY):

THIS MATERIAL IS STABLE IN CLOSED CONTAINERS AT ROOM TEMPERATURE UNDER NORMAL STORAGE AND HANDLING CONDITIONS. HEATING GREATLY INCREASES THE FLAMMABILITY HAZARD OF THIS OSHA CLASS II COMBUSTIBLE LIQUID.

INCOMPATIBILITY (MATERIALS TO AVOID):

KEROSENE IS INCOMPATIBLE WITH STRONG OXIDIZING AGENTS.

HAZARDOUS DECOMPOSITION PRODUCTS:

THERMAL-OXIDATIVE DEGRADATION CAN YIELD PARTIAL OXIDATION PRODUCTS, HYDROCARBONS, CARBON MONOXIDE AND DIOXIDE, AND SMALL AMOUNTS OF SULFUR DIOXIDE (DEPENDING ON SULFUR CONTENT).

HAZARDOUS POLYMERIZATION POSSIBLE (Y/N) ? N

CONDITIONS TO AVOID (REGARDING POLYMERIZATION):

* SECTION VI - HEALTH HAZARDS *

ROUTES OF ENTRY: INHALATION, EYE CONTACT, SKIN CONTACT, INGESTION

SIGNS AND SYMPTOMS OF -
ACUTE OVEREXPOSURE:

INHALATION OF EXCESSIVE VAPOR OR MIST IS IRRITATION TO RESPIRATORY PASSAGES AND CAN LEAD TO HEADACHE, DIZZINESS, NAUSEA, STUPOR, CONVULSIONS OR LOSS OF CONSCIOUSNESS, DEPENDING ON CONCENTRATION AND TIME OF EXPOSURE. HIGH VAPOR CONCENTRATION OR LIQUID CONTACT CAN IRRITATE EYES. PROLONGED OR REPEATED CONTACT WITH SKIN CAN CAUSE DEFATTING, IRRITATION AND DERMATITIS. INGESTION OF KEROSENE CAN BE IRRITATING TO THE MOUTH, THROAT, AND DIGESTIVE TRACT. ASPIRATION INTO THE LUNGS MAY CAUSE HEMORRHAGING, PULMONARY EDEMA, AND CHEMICAL PNEUMONITIS.

NIC OVEREXPOSURE:

CHEMICAL LISTED AS A CARCINOGEN OR POTENTIAL CARCINOGEN
NATIONAL TOXICOLOGY PROGRAM (Y/N):

IARC MONOGRAPHS (Y/N):

OSHA (Y/N):

MEDICAL CONDITIONS GENERALLY AGGRAVATED BY EXPOSURE:

***** ADDITIONAL INFORMATION *****

TLV: NONE ESTABLISHED

EMERGENCY AND FIRST AID PROCEDURES

EMERGENCY PHONE NUMBER OF MANUFACTURER:

1. INHALATION: REMOVE TO FRESH AIR. RESTORE AND/OR SUPPORT BREATHING AS REQUIRED.
2. EYE CONTACT: FLUSH THOROUGHLY WITH RUNNING WATER FOR 15 MIN. INCLUDING UNDER EYELIDS.
3. SKIN CONTACT: REMOVE CONTAMINATED CLOTHING. WASH AFFECTED AREA WITH SOAP AND WATER.

INGESTION: CONTACT PHYSICIAN! ASPIRATION HAZARD! DO NOT INDUCE VOMITING. IF SPONTANEOUS VOMITING OCCURS, HOLD THE VICTIM'S HEAD LOWER THAN HIPS TO HELP PREVENT PULMONARY ASPIRATION.

***** ADDITIONAL INFORMATION *****

SEEK MEDICAL ASSISTANCE FOR FURTHER TREATMENT, OBSERVATION AND SUPPORT AFTER FIRST AID.

* SECTION VII - PRECAUTIONS FOR SAFE HANDLING AND USE *

HAZARD CLASS ...: COMBUSTIBLE LIQUID.
U.S. DOT ID: UN 1223
UN/NA NUMBER ...:

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE:
STORE IN CLOSED CONTAINERS IN A WELL-VENTILATED AREA AWAY FROM SOURCES OF HEAT, IGNITINO, AND STRONG OXIDIZING AGENTS. PROTECT CONTAINERS FROM

ICAL DAMAGE. OUTDOOR OR DETACHED STORAGE PREFERRED FOR LARGE AMOUNTS. OF NON-SPARKING TOOLS AND EXPLOSION-PROOF ELECTRICAL SERVICES MAY BE DESIRABLE. GROUND AND BOND CONTAINERS TO PREVENT STATIC SPARKS. NO SMOKING IN AREAS OF USE. STORAGE CONDITIONS MUST MEET REQUIREMENTS FOR AN OSHA CLASS II COMBUSTIBLE LIQUID. AVOID PROLONGED OR REPEATED SKIN CONTACT AND BREATHING OF VAPORS OR MISTS. FOLLOW GOOD HYGIENIC PRACTICE IN THE USE OF THIS MATERIAL. DO NOT PUT OILY RAGS INTO POCKETS. WASH HANDS AND EXPOSED SKIN FREQUENTLY DURING WORK DAY.

OTHER PRECAUTIONS:

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED:
NOTIFY SAFETY PERSONNEL OF LARGE LEAKS OR SPILLS. REMOVE SOURCES OF HEAT OR IGNITION. PROVIDE OPTIMUM EXPLOSION-PROOF VENTILATION. CLEAN UP PERSONNEL NEED PROTECTION AGAINST LIQUID CONTACT AND VAPOR OR MIST INHALATION. CONTAIN SPILL AND COLLECT LIQUID. DO NOT FLUSH TO SEWER OR SURFACE WATER. USE ABSORBENT MATERIAL (SAND, VERMICULITE) TO PICK UP SMALL SPILLS AND RESIDUES PROMPTLY TO REDUCE FIRE OR VAPOR HAZARD. USE NON-SPARKING TOOLS.

WASTE DISPOSAL METHODS:
MAY BE DISPOSED OF THROUGH A LICENSED WASTE DISPOSAL COMPANY, OR BY CONTROLLED INCINERATION OR ABSORBED MATERIAL CAN BE BURIED IN AN APPROVED LANDFILL. FOLLOW FEDERAL, STATE, AND LOCAL REGULATIONS.

***** ADDITIONAL INFORMATION *****

SOURCE(S) CODE: 4-11,14,26,34,37,39,48,49

* SECTION VIII - CONTROL MEASURES *

RESPIRATORY PROTECTION:
PROVIDE APPROVED ORGANIC MIST AND VAPOR RESPIRATORY APPARATUS FOR NONROUTINE OR EMERGENCY USE.

VENTILATION REQUIREMENTS:
PROVIDE GENERAL AND LOCAL EXHAUST VENTILATION ESPECIALLY IF HEATED OR MISTED AS NEEDED TO KEEP MIST AND VAPORS AT A LOW LEVEL.

LOCAL EXHAUST:
SEE HEREIN

MECHANICAL:

IAL:

OTHER:

PROTECTIVE GLOVES:
SEE HEREIN

EYE PROTECTION:
SEE HEREIN

OTHER PROTECTIVE CLOTHING OR EQUIPMENT:
WEAR PROTECTIVE RUBBER GLOVES TO PREVENT REPEATED OR PROLONGED CONTACT AND SAFETY GLASSES IF SPLASHING OF LIQUID MAY OCCUR. ADDITIONAL PROTECTIVE CLOTHING MAY BE REQUIRED DEPENDING ON WORKING CONDITIONS. LAUNDER WORK CLOTHES AT LEAST WEEKLY AND WHEN CONTAMINATED BEFORE REUSE. EYEWASH STATIONS AND WASHING FACILITIES SHOULD BE AVAILABLE TO AREAS OF USE AND HANDLING.

WORK/HYGIENIC PRACTICES:

***** GENERAL INFORMATION *****
JUDGMENTS AS TO THE SUITABILITY HEREIN FOR PURCHASER'S PURPOSE ARE NECESSARILY PURCHASER'S RESPONSIBILITY. THEREFORE, ALTHOUGH REASONABLE CARE HAS BEEN TAKEN IN THE PREPARATION OF SUCH INFORMATION. GENIUM WASHING CORPORATION EXTENDS NO WARRANTIES, MAKES NO REPRESENTATIONS AND ASSUMES NO RESPONSIBILITY AS TO THE ACCURACY OR SUITABILITY OF SUCH INFORMATION FOR APPLICATION TO PURCHASER'S INTENDED PURPOSES OR FOR CONSEQUENCES OF ITS USE.

1. Chemical product and Company Identification

Company Identification Dixon Ticonderoga Company
 195 International Parkway
 Heathrow, FL 32746-5036
 Telephone: 800-824-9430

Date prepared: May 7, 2003
Last revised: May 22, 2006
Emergency call: 800-824-9430

Product Name Dixon Premium Lumber Crayon
Product Code(s) 49200, 49300, 49400, 49500, 49600, 49700, 52000, 52112, 52012, 52200, 52300, 52600

2. Composition/Information On Ingredients

Component	CAS Reg. No	Percent Weight
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This product is not considered to be a hazardous substance as defined under OSHA's Hazard Communication Standard (29 CFR 1910.1200)

3. Hazards Identification

Emergency Overview Not an acute hazard
CAUTION!
 Packaging may be subject to ignition by fire and may release toxic or other irritating gases

4. First Aid Measures

Eye Contact Flush eyes large amounts of water for at least fifteen minutes. Contact physician
Skin Contact Wash skin with soap and water. Seek medical attention in the unlikely event that irritation occurs
Ingestion Unlikely to be toxic by ingestion, but seek medical attention
Inhalation No applies

5. Fire Fighting Measures

Extinguishing Media Carbon dioxide, dry chemical or foam recommended. Apply water to cool exposed closed containers
Special Fire Fighting Procedures Self contained breathing apparatus (SCBA) and full protective equipment recommended
Unusual Fire and Explosion Hazards Packaging may be subject to ignition by fire and may release toxic gases

Flammability Data

Flash Point	No data
Flammability limits	No data
Auto-ignition temperature	No data
Dust cloud ignition temperature	No data
Dust layer ignition temperature	No data

HMIS Ratings	
Health	1
Flammability	0
Reactivity	0
Protective Equipment	A

6. Accidental Release Measures

Small spill Sweep or wipe up material. Place spilled material into appropriate waste containers for disposal
Large spill Sweep or wipe up material. Place spilled material into appropriate waste containers for disposal

7. Handling and Storage

Handling Contents will stain. The use of smocks and gloves to protect personal clothing is suggested. Wash hands and surface after use.
Storing Do not store near heat or open flame

Continued on next page

8. Exposure Controls/Personal Protection

Engineering Controls	The use of local ventilation is recommended
Personal protection	No special skin protection required. Wash skin if irritation is experienced. Eye protection is recommended

9. Physical and Chemical Properties

Physical State	Solid
Appearance	4 1/2" X 1/2" hexagon stick
Color	Various colors
Odor	No odor
pH	No data
Specific gravity	No data
Boiling point	No data
Freezing/melting point	No data
Evaporation rate	No data
Solubility	No data
Volatility	No data

10. Stability and Reactivity

General	This product is stable and hazardous polymerization will not occur
Incompatibility	None known
Hazardous decomposition	As with all burning organic matter, carbon monoxide and other toxic fumes may be released

11. Toxicological Information

Acute/Chronic Toxicity	This product is not considered to be a hazardous substance under OSHA's
Carcinogenicity	Federal Hazard Communication Standard 29 CFR 1910.1200
Mutagenicity	

12. Ecological Information

This product has not been evaluated for overall environmental effects

13. Disposal Considerations

Contain and place in approved container. Dispose of per Local, State, and Federal regulations

14. Transportation Information

DOT Classification	Not regulated (US)	UN/NA Number	Not regulated
TDG Classification	Not regulated (Canada)	IMO/IMDG Classification	Not regulated
ADR/RID Classification	Not regulated (Europe)	ICAO/IATA Classification	Not regulated

15. Regulatory Information

OSHA Hazard Communication Status	This product is not considered to be a hazardous substance under OSHA's Federal Hazard Communication Standard 29 CFR 1910.1200
Toxic Substances Control Act (TSCA) Status	All ingredients of this material has been reported to the US EPA and are included in the TSCA inventory

16. Other Information

For further product safety information call 800-824-9430

Validated and Verified by Dixon Ticonderoga Co.
May 22 2006

This information contained herein is based on data considered accurate. However no warranty is expressed or implied regarding the accuracy of these data or results obtained from the use thereof. Dixon Ticonderoga company assumes no responsibility for personal damage caused by the product. Users assume all risks associated with use.



Health	2
Fire	2
Reactivity	0
Personal Protection	E

Material Safety Data Sheet Naphthalene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Naphthalene

Catalog Codes: SLN1789, SLN2401

CAS#: 91-20-3

RTECS: QJ0525000

TSCA: TSCA 8(b) inventory: Naphthalene

CI#: Not available.

Synonym:

Chemical Name: Not available.

Chemical Formula: C₁₀H₈

Contact Information:

Sciencelab.com, Inc.
14025 Smith Rd.
Houston, Texas 77396

US Sales: **1-800-901-7247**
International Sales: **1-281-441-4400**

Order Online: ScienceLab.com

CHEMTREC (24HR Emergency Telephone), call:
1-800-424-9300

International CHEMTREC, call: 1-703-527-3887

For non-emergency assistance, call: 1-281-441-4400

Section 2: Composition and Information on Ingredients

Composition:

Name	CAS #	% by Weight
Naphthalene	91-20-3	100

Toxicological Data on Ingredients: Naphthalene: ORAL (LD50): Acute: 490 mg/kg [Rat]. 533 mg/kg [Mouse]. 1200 mg/kg [Guinea pig]. DERMAL (LD50): Acute: 20001 mg/kg [Rabbit]. VAPOR (LC50): Acute: 170 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:

Very hazardous in case of ingestion. Hazardous in case of eye contact (irritant), of inhalation. Slightly hazardous in case of skin contact (irritant, permeator). Severe over-exposure can result in death.

Potential Chronic Health Effects:

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH.

MUTAGENIC EFFECTS: Not available.

TERATOGENIC EFFECTS: Not available.

DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE].

The substance is toxic to blood, kidneys, the nervous system, the reproductive system, liver, mucous membranes, gastrointestinal tract, upper respiratory tract, central nervous system (CNS).

Repeated or prolonged exposure to the substance can produce target organs damage. Repeated exposure to an highly toxic material may produce general deterioration of health by an accumulation in one or many human organs.

Section 4: First Aid Measures

Eye Contact:

Check for and remove any contact lenses. Immediately flush eyes with running water for at least 15 minutes, keeping eyelids open. Cold water may be used. Do not use an eye ointment. Seek medical attention.

Skin Contact:

After contact with skin, wash immediately with plenty of water. Gently and thoroughly wash the contaminated skin with running water and non-abrasive soap. Be particularly careful to clean folds, crevices, creases and groin. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact: Not available.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation:

Evacuate the victim to a safe area as soon as possible. Loosen tight clothing such as a collar, tie, belt or waistband. If breathing is difficult, administer oxygen. If the victim is not breathing, perform mouth-to-mouth resuscitation. **WARNING:** It may be hazardous to the person providing aid to give mouth-to-mouth resuscitation when the inhaled material is toxic, infectious or corrosive. Seek immediate medical attention.

Ingestion:

Do not induce vomiting. Examine the lips and mouth to ascertain whether the tissues are damaged, a possible indication that the toxic material was ingested; the absence of such signs, however, is not conclusive. Loosen tight clothing such as a collar, tie, belt or waistband. If the victim is not breathing, perform mouth-to-mouth resuscitation. Seek immediate medical attention.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 567°C (1052.6°F)

Flash Points: CLOSED CUP: 88°C (190.4°F). OPEN CUP: 79°C (174.2°F).

Flammable Limits: LOWER: 0.9% UPPER: 5.9%

Products of Combustion: These products are carbon oxides (CO, CO₂).

Fire Hazards in Presence of Various Substances: Not available.

Explosion Hazards in Presence of Various Substances:

Risks of explosion of the product in presence of mechanical impact: Not available.

Risks of explosion of the product in presence of static discharge: Not available.

Fire Fighting Media and Instructions:

Flammable solid.

SMALL FIRE: Use DRY chemical powder.

LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill: Use appropriate tools to put the spilled solid in a convenient waste disposal container.

Large Spill:

Flammable solid.

Stop leak if without risk. Do not touch spilled material. Use water spray curtain to divert vapor drift. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. Call for assistance on disposal. Be careful that the product is not present at a concentration level above TLV. Check TLV on the MSDS and with local authorities.

Section 7: Handling and Storage

Precautions:

Keep locked up Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe dust. Avoid contact with eyes Wear suitable protective clothing In case of insufficient ventilation, wear suitable respiratory equipment If ingested, seek medical advice immediately and show the container or the label. Keep away from incompatibles such as oxidizing agents.

Storage:

Flammable materials should be stored in a separate safety storage cabinet or room. Keep away from heat. Keep away from sources of ignition. Keep container tightly closed. Keep in a cool, well-ventilated place. Ground all equipment containing material. Keep container dry. Keep in a cool place.

Section 8: Exposure Controls/Personal Protection

Engineering Controls:

Use process enclosures, local exhaust ventilation, or other engineering controls to keep airborne levels below recommended exposure limits. If user operations generate dust, fume or mist, use ventilation to keep exposure to airborne contaminants below the exposure limit.

Personal Protection:

Splash goggles. Lab coat. Dust respirator. Be sure to use an approved/certified respirator or equivalent. Gloves.

Personal Protection in Case of a Large Spill:

Splash goggles. Full suit. Dust respirator. Boots. Gloves. A self contained breathing apparatus should be used to avoid inhalation of the product. Suggested protective clothing might not be sufficient; consult a specialist BEFORE handling this product.

Exposure Limits:

Israel: TWA: 10 (ppm)

TWA: 10 STEL: 15 (ppm) from ACGIH (TLV) [1995]

TWA: 52 STEL: 79 (mg/m³) from ACGIH [1995]

Australia: STEL: 15 (ppm)

Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Solid. (Crystalline solid.)

Odor: Aromatic.

Taste: Not available.

Molecular Weight: 128.19 g/mole

Color: White.

pH (1% soln/water): Not available.

Boiling Point: 218°C (424.4°F)

Melting Point: 80.2°C (176.4°F)

Critical Temperature: Not available.

Specific Gravity: 1.162 (Water = 1)

Vapor Pressure: Not applicable.

Vapor Density: 4.4 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.038 ppm

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties:

Partially dispersed in hot water, methanol, n-octanol.

Very slightly dispersed in cold water.

See solubility in methanol, n-octanol.

Solubility:

Partially soluble in methanol, n-octanol.

Very slightly soluble in cold water, hot water.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Not available.

Incompatibility with various substances: Highly reactive with oxidizing agents.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: May attack some forms of rubber and plastic

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Dermal contact. Eye contact. Inhalation. Ingestion.

Toxicity to Animals:

WARNING: THE LC50 VALUES HEREUNDER ARE ESTIMATED ON THE BASIS OF A 4-HOUR EXPOSURE.

Acute oral toxicity (LD50): 490 mg/kg [Rat].

Acute dermal toxicity (LD50): 20001 mg/kg [Rabbit].

Acute toxicity of the vapor (LC50): 170 ppm 4 hour(s) [Rat].

Chronic Effects on Humans:

CARCINOGENIC EFFECTS: A4 (Not classifiable for human or animal.) by ACGIH.

DEVELOPMENTAL TOXICITY: Classified Development toxin [POSSIBLE].
The substance is toxic to blood, kidneys, the nervous system, the reproductive system, liver, mucous membranes, gastrointestinal tract, upper respiratory tract, central nervous system (CNS).

Other Toxic Effects on Humans:

Very hazardous in case of ingestion.
Hazardous in case of inhalation.
Slightly hazardous in case of skin contact (irritant, permeator).

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans: Not available.

Special Remarks on other Toxic Effects on Humans: Not available.

Section 12: Ecological Information

Ecotoxicity: Ecotoxicity in water (LC50): 305.2 ppm 96 hour(s) [Trout].

BOD5 and COD: Not available.

Products of Biodegradation:

Possibly hazardous short term degradation products are not likely. However, long term degradation products may arise.

Toxicity of the Products of Biodegradation: The products of degradation are more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: CLASS 4.1: Flammable solid.

Identification: : Naphthalene, refined : UN1334 PG: III

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:

Rhode Island RTK hazardous substances: Naphthalene
Pennsylvania RTK: Naphthalene
Florida: Naphthalene
Minnesota: Naphthalene
Massachusetts RTK: Naphthalene
TSCA 8(b) inventory: Naphthalene
TSCA 8(a) PAIR: Naphthalene
TSCA 8(d) H and S data reporting: Naphthalene: 06/01/87
SARA 313 toxic chemical notification and release reporting: Naphthalene: 1%
CERCLA: Hazardous substances.: Naphthalene: 100 lbs. (45.36 kg)

Other Regulations:

OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

EINECS: This product is on the European Inventory of Existing Commercial Chemical Substances.

Other Classifications:

WHMIS (Canada):

CLASS B-4: Flammable solid.

CLASS D-1B: Material causing immediate and serious toxic effects (TOXIC).

CLASS D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):

R36- Irritating to eyes.

R40- Possible risks of irreversible effects.

R48/22- Harmful: danger of serious damage to health by prolonged exposure if swallowed.

R48/23- Toxic: danger of serious damage to health by prolonged exposure through inhalation.

R63- Possible risk of harm to the unborn child.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 2

Reactivity: 0

Personal Protection: E

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 2

Reactivity: 0

Specific hazard:

Protective Equipment:

Gloves.

Lab coat.

Dust respirator. Be sure to use an approved/certified respirator or equivalent. Wear appropriate respirator when ventilation is inadequate.

Splash goggles.

Section 16: Other Information

References: Not available.

Other Special Considerations: Not available.

Created: 10/11/2005 01:30 PM

Last Updated: 10/11/2005 01:30 PM

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

NITRIC ACID REAGENT GRADE
105912

1. IDENTIFICATION OF THE SUBSTANCE/PREPARATION AND OF THE COMPANY/UNDERTAKING

Ashland	Regulatory Information Number	1-800-325-3751
P.O. Box 2219	Telephone	614-790-3333
Columbus, OH 43216	Emergency telephone	1-800-ASHLAND (1-800-274-5263)

Product name	NITRIC ACID REAGENT GRADE
Product code	105912
Product Use Description	No data

2. HAZARDS IDENTIFICATION

Emergency Overview

Appearance: liquid, colourless

DANGER! STRONG OXIDIZER. CONTACT WITH OTHER MATERIAL MAY CAUSE FIRE. MAY BE HARMFUL. MAY CAUSE SEVERE BURNS OF RESPIRATORY AND DIGESTIVE TRACTS. CAUSES SEVERE BURNS OF THE EYES AND SKIN.

Potential Health Effects

Routes of exposure

Inhalation, Skin absorption, Skin contact, Eye Contact, Ingestion

Eye contact

Can cause permanent eye injury. Symptoms include stinging, tearing, redness, and swelling of eyes. Can injure the cornea and cause blindness.

Skin contact

Can cause permanent skin damage. Symptoms may include redness, burning, and swelling of skin, burns, and other skin damage. Additional symptoms of skin contact may include: abnormal coloring of the skin

Ingestion

Swallowing this material may be harmful or fatal. Symptoms may include severe stomach and intestinal irritation (nausea, vomiting, diarrhea), abdominal pain, and vomiting of blood. Swallowing this material may cause burns and destroy tissue in the

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mouth, throat, and digestive tract. Low blood pressure and shock may occur as a result of severe tissue injury.

Inhalation

Breathing of vapor or mist is possible. Breathing this material may be harmful or fatal. Symptoms may include severe irritation and burns to the nose, throat, and respiratory tract. Symptoms are not expected at air concentrations below the recommended exposure limits, if applicable (see Section 8.).

Aggravated Medical Condition

Preexisting disorders of the following organs (or organ systems) may be aggravated by exposure to this material: skin, lung (for example, asthma-like conditions)

Symptoms

Signs and symptoms of exposure to this material through breathing, swallowing, and/or passage of the material through the skin may include: stomach or intestinal upset (nausea, vomiting, diarrhea), irritation (nose, throat, airways), cough, choking, lung edema (fluid buildup in the lung tissue), lung damage

Target Organs

Overexposure to this material (or its components) has been suggested as a cause of the following effects in humans: damage to tooth enamel, chronic bronchitis, effects on lung function

Carcinogenicity

This material is not listed as a carcinogen by the International Agency for Research on Cancer (IARC), the National Toxicology Program (NTP), or the Occupational Safety and Health Administration (OSHA).

Reproductive hazard

There are no data available for assessing risk to the fetus from maternal exposure to this material.

3. COMPOSITION/INFORMATION ON INGREDIENTS

Components	CAS-No.	Concentration
NITRIC ACID	7697-37-2	>=70-<80%

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4. FIRST AID MEASURES

Eyes

If material gets into the eyes, immediately flush eyes gently with water for at least 15 minutes while holding eyelids apart. If symptoms develop as a result of vapor exposure, immediately move individual away from exposure and into fresh air before flushing as recommended above. Seek immediate medical attention.

Skin

Immediately flush skin with water for at least 15 minutes while removing contaminated clothing and shoes. Seek immediate medical attention. Wash clothing before reuse and discard contaminated shoes.

Ingestion

Seek immediate medical attention. Do not induce vomiting. Vomiting will cause further damage to the mouth and throat. If individual is conscious and alert, immediately rinse mouth with water and give milk or water to drink. If possible, do not leave individual unattended.

Inhalation

If symptoms develop, immediately move individual away from exposure and into fresh air. Seek immediate medical attention; keep person warm and quiet. If person is not breathing, begin artificial respiration. If breathing is difficult, administer oxygen.

Notes to physician

Hazards: Pulmonary edema may be delayed.

Treatment: No information available.

5. FIRE-FIGHTING MEASURES

Suitable extinguishing media

Water mist, Carbon dioxide (CO₂), Dry chemical

Hazardous combustion products

May form: acid vapors, nitrogen oxides

Precautions for fire-fighting

Substance is an oxidizer that will cause moderate increase in the burning rate of combustible materials with which it comes into contact. Wear full firefighting turn-out gear (full Bunker gear), and respiratory protection (SCBA). Use water spray to cool fire

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exposed containers and structures until fire is out if it can be done with minimal risk.
Avoid spreading burning liquid with water used for cooling purposes.

6. ACCIDENTAL RELEASE MEASURES

Personal precautions

No data

Environmental precautions

Prevent run-off to sewers, streams or other bodies of water. If run-off occurs, notify proper authorities as required, that a spill has occurred.

Methods for cleaning up

Persons not wearing protective equipment should be excluded from area of spill until clean-up is completed. Stop spill at source. Dike to prevent spreading. Pump to salvage tank. Cover the contaminated surface with sodium bicarbonate or a soda ash/flaked lime mixture (50-50). Mix and add water if necessary to form a slurry. Scoop up slurry and wash site with soda ash solution. Proper mixing procedures are essential. Trained personnel should conduct this procedure. Untrained personnel should be removed from the spill area.

7. HANDLING AND STORAGE

Handling

No data

Storage

No data

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Exposure Guidelines

NITRIC ACID		7697-37-2
ACGIH	time weighted average	2 ppm
ACGIH	Short term exposure limit	4 ppm
NIOSH	Recommended exposure limit (REL):	2 ppm
NIOSH	Recommended exposure limit (REL):	5 mg/m3

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NIOSH	Short term exposure limit	4 ppm
NIOSH	Short term exposure limit	10 mg/m3
OSHA Z1	Permissible exposure limit	2 ppm
OSHA Z1	Permissible exposure limit	5 mg/m3

General advice

These recommendations provide general guidance for handling this product. Personal protective equipment should be selected for individual applications and should consider factors which affect exposure potential, such as handling practices, chemical concentrations and ventilation. It is ultimately the responsibility of the employer to follow regulatory guidelines established by local authorities.

Exposure controls

Provide sufficient mechanical (general and/or local exhaust) ventilation to maintain exposure below TLV(s).

Eye protection

Chemical splash goggles and face shield (8" min.) in compliance with OSHA regulations are advised; however, OSHA regulations also permit other type safety glasses. (Consult your industrial hygienist.)

Skin and body protection

Wear resistant gloves (consult your safety equipment supplier).
To prevent skin contact, wear impervious clothing and boots.
Wear resistant gloves (consult your safety equipment supplier).
To prevent skin contact, wear impervious clothing and boots.

Respiratory protection

If workplace exposure limit(s) of product or any component is exceeded (see exposure guidelines), a NIOSH-approved air supplied respirator is advised in absence of proper environmental control. OSHA regulations also permit other NIOSH respirators (negative pressure type) under specified conditions (see your industrial hygienist). Engineering or administrative controls should be implemented to reduce exposure.

9. PHYSICAL AND CHEMICAL PROPERTIES

Physical state	liquid
Form	No data
Colour	colourless
Odour	No data

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Boiling point/boiling range	180.00 °F / 180 °F @ 760.00 mmHg
pH	(<) 1.0
Flash point	No data
Evaporation rate	1 (Ethyl Ether)
Explosion limits	No data
Vapour pressure	5.50 mmHg @ 68.00 °F / 20.00 °C
Vapour density	1.3 (AIR=1)
Density	1.412 g/cm ³ @ 68.00 °F / 20.00 °C 11.76 lb/gal @ 68.00 °F / 20.00 °C
Solubility	No data
Partition coefficient: n-octanol/water	No data
Autoignition temperature	No data

10. STABILITY AND REACTIVITY

Stability

Stable.

Conditions to avoid

Avoid contact with:

Incompatible products

Avoid contact with: organic materials, reducing agents, strong alkalis

Hazardous decomposition products

May form: nitrogen oxides (NO_x)

Hazardous reactions

Product will not undergo hazardous polymerization. Acid reacts with most metals to release hydrogen gas which can form explosive mixtures with air.

Thermal decomposition

No data

11. TOXICOLOGICAL INFORMATION

Acute oral toxicity

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Acute inhalation toxicity

NITRIC ACID

LC 50 Rat: 65 ppm, 4 h

Acute dermal toxicity

12. ECOLOGICAL INFORMATION

Aquatic toxicity

Acute and Prolonged Toxicity to Fish

No data

Acute Toxicity to Aquatic Invertebrates

No data

Environmental fate and pathways

No data

13. DISPOSAL CONSIDERATIONS

Waste disposal methods

For assistance with your waste management needs - including disposal, recycling and waste stream reduction, contact Ashland Distribution's Environmental Services Group at 800-637-7922.

14. TRANSPORT INFORMATION

IMDG:

UN2031, NITRIC ACID 8, II

IATA_P:

UN2031, Nitric acid 8, II

IATA_C:

UN2031, Nitric acid 8, II

CFR_ROAD:

UN2031, Nitric acid 8, II

CFR_RAIL:

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UN2031, Nitric acid 8, II
CFR_INWTR:
UN2031, Nitric acid 8, II

Dangerous goods descriptions (if indicated above) may not reflect package size, quantity, end-use or region-specific exceptions that can be applied. Consult shipping documents for descriptions that are specific to the shipment.

15. REGULATORY INFORMATION

California Prop. 65

This product does not contain any chemicals known to State of California to cause cancer, birth, or any other reproductive defects.

SARA Hazard Classification Acute Health Hazard

SARA 313 Component(s)

NITRIC ACID 7697-37-2 70%

	Health	Flammability	Reactivity	Other
HMIS				No data
NFPA	3	1	0	

16. OTHER INFORMATION

The information accumulated herein is believed to be accurate but is not warranted to be whether originating with the company or not. Recipients are advised to confirm in advance of need that the information is current, applicable, and suitable to their circumstances. This MSDS has been prepared by Ashland's Environmental Health and Safety Department (1-800-325-3751).

Initial Preparation Date: 11/10/2004
Last Revision Date: None
Effective Date: 5/3/2007

MATERIAL SAFETY DATA SHEET

PRODUCT IDENTITY: PEAK® 20° WASH

1. CHEMICAL PRODUCT & COMPANY INFORMATION

OLD WORLD INDUSTRIES, INC.
4065 COMMERCIAL AVENUE
NORTHBROOK, ILLINOIS 60062
PHONE: 847-559-2000
EMERGENCY PHONE: 1-800-424-9300 (CHEMTREC)

2. COMPOSITION / INFORMATION ON INGREDIENTS

<u>MATERIAL</u>	<u>CAS#</u>	<u>% BY WT</u>	<u>8-Hour Time Weighted Avg. (TWA)</u>
Methanol	67-56-1	8	200 ppm (260 Mg/M ³)

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

<i>Slight odor.</i>	<i>May be fatal if swallowed.</i>	<i>Vapors can cause eye irritation.</i>
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LD50 Rat (Oral): 56,280 mg/kg (10% methanol concentration)
LD50 Rabbit (Skin): 200 g/kg (10% methanol concentration)
Carcinogenicity: No
National Toxicology Program: No
International Agency for Research on Cancer: No
OSHA Regulated: Yes

HAZARD RATING SYSTEM

HMIS: HEALTH: 2 FLAMMABILITY: 2 REACTIVITY: 0 PERSONAL PROTECTION: A

KEY: 0 - Minimal 1 - Slight 2 - Moderate 3 - Serious 4 - Severe A - Safety glasses

POTENTIAL HEALTH EFFECTS

Health Hazards (Acute and Chronic):

Acute:

Acute methanol intoxication is manifested initially by signs of narcosis. This is followed by a latent period in which formic acid accumulates in the body causing metabolic acidosis. Severe abdominal, leg, and back pain occur and visual degeneration can lead to blindness.

1. Humans – Ingestion of 80 to 150 mL of methanol is usually fatal to humans (HSDB 1994). One worker died from exposure to vapor ranging from 4,000 to 13,000 ppm over 12 hours (ACGIH 1991). The concentration of 4,000 ppm is roughly equivalent to a total of 1,140 mg/kg over the 12-hour period (see end note 2). Poisoning by nonlethal doses can be described in three stages: (1) narcotic stage similar to ethanol; (2) latent period of 10-15 hours; (3) visual disturbances and central nervous system lesions (Rowe and McCollister 1981). Visual disturbances can lead to blindness due to edema of the retina and atrophy of the optic nerve head (HSDB 1994). Third-stage CNS lesions include headache, dizziness, abdominal, back, and leg pain, delirium that can lead to coma, and nausea (HSDB 1994). Formic acid production causes severe metabolic acidosis (Rowe and McCollister 1981).
2. Animals – Oral LD50 values for methanol in animals are 0.4 g/kg in the mouse, 6.2 to 13 g/kg in the rat, 14.4 g/kg in the rabbit, and 2 to 7 g/kg in the monkey (Rowe and McCollister 1981). The LD50 for dermal application to rabbits is 20 mL/kg (approximately 16 g/kg) (Rowe and McCollister 1981). Dose-response data for inhalation vary with species, dose, and duration (8,800 ppm for 8 hours to 152,800 ppm for 94 minutes). Symptoms of intoxication include incoordination, salivation, lethargy, narcosis, and death (Rowe and McCollister 1981).

Subchronic/Chronic:

Chronic exposure to methanol, either orally or by inhalation, causes headache, insomnia, gastrointestinal problems, and blindness in humans and hepatic and brain alterations in animals. EPA has derived an oral RfD (reference dose) (see end note 3) for methanol of 0.5 mg/kg/day, based on the absence of liver and brain effects in animals exposed by mouth to 500 mg/kg/day.

1. Humans – “Chronic” exposure to methanol vapors (no time or dose given) caused conjunctivitis, headache, giddiness, insomnia, gastric disturbances, and bilateral blindness (ACGIH 1991). Marked vision loss occurred in one worker exposed to 1,200 to 8,000 ppm vapor for 4 years (ACGIH 1991).
2. Animals – No effects were seen in rats given 1% (approximately 140 mg/kg/day) methanol in drinking water for 6 months (Rowe and McCollister 1981). Hepatic abnormalities (proteinic degeneration, altered RNA metabolism) occurred in rhesus monkeys given 3 to 6 g/kg for 3 to 20 weeks and in rats given 10, 100, or 500 mg/kg/day for one month (Rowe and McCollister 1981). Rabbits chronically fed methanol (no dose or time given) had increasing blood levels, brain and eye edema, and myelin thinning (HSDB 1994). Male and female rats were gavaged with 100, 500, or 2,500 mg/kg/day for 90 days (U.S. EPA 1994). Increased levels of SGPT and SAP as well as decreased brain weights were seen in both sexes at the highest dose; a no-observed-adverse effect level (NOAEL) for the study was 500 mg/kg/day. Based on these data, the U.S. EPA (1994) calculated a chronic RfD (see end note 4) for methanol of 0.5 mg/kg/day.

No toxic effects were seen in dogs exposed by inhalation to either 10,000 ppm for 3 minutes, 3x/day, for 100 days or to 450 or 500 ppm, 8 hours/day for 379 days (Rowe and McCollister 1981). Ultrastructural changes were observed in the photoreceptor cells of rabbits exposed to 46.6 ppm for 6 months (Rowe and McCollister 1981). Rowe and McCollister (1981) concluded that the effects of combined oral and inhalation exposure appear to be additive. Rats exposed by inhalation to 16.8 ppm, 4 hours/day, for 6 months and administered 0.7 mg/kg/day orally had changes in blood morphology, oxidation-reduction processes, and liver function (Rowe and McCollister 1981).

Carcinogenicity:

No information was found on the carcinogenicity of methanol in the secondary sources searched.

1. Humans – No information was found in the secondary sources searched concerning the carcinogenicity of methanol to humans.
2. Animals – No information was found in the secondary sources searched concerning the carcinogenicity of methanol to animals. The NTP has assigned a project leader for methanol and the design of the study is in progress (NTP 1994).

4. FIRST AID MEASURES

Ensure physician has access to this MSDS.

Routes of Entry: Inhalation, Skin, Ingestion

Signs and Symptoms of Exposure:

Eye Contact: May cause eye irritation.

Skin Contact: Frequent or prolonged contact may cause skin irritation experienced as burning, drying, cracking and redness.

Inhalation: May cause nose and throat irritation. High concentrations may cause acute central nervous system depression characterized by headaches, dizziness, nausea and confusion.

Skin Absorption Health Risks and Symptoms of Exposure: Harmful quantities of Methyl Alcohol may affect eyes and central nervous system.

Ingestion Health Risks and Symptoms of Exposure: May cause nausea, abdominal pain, headache, shortness of breath, visual impairment and blindness. Severe poisoning can cause coma and death.

Medical Conditions Generally Aggravated by Exposure: Ingestion of large amounts of Methyl Alcohol has been shown to damage organs including liver, kidney, pancreas, heart, lungs and brain. Although this rarely occurs, survivors of severe intoxication may suffer permanent neurological damage. Overexposure may aggravate pre-existing disorders of the eyes.

People have died as a result of drinking large amounts of methanol. Drinking smaller, non-lethal amounts of methanol adversely affects the human nervous system. Effects range from headaches to incoordination similar to that associated with drunkenness. Delayed effects such as severe abdominal, leg, and back pain can follow the inebriation effects of methanol. Loss of vision and even blindness can also occur after exposure to amounts of

methanol causing inebriation. These effects are not likely to occur at levels of methanol that are normally found in the environment.

Human health effects associated with breathing or otherwise consuming smaller amounts of methanol over long periods of time are not known. Workers repeatedly exposed to methanol have experienced several adverse effects. Effects range from headaches to sleep disorders and gastrointestinal problems to optic nerve damage. Laboratory studies show that repeat exposure to large amounts of methanol in air or in drinking water cause similar adverse effects in animals.

TREATMENT

Eyes: Flush with large quantities of water for 15 minutes and seek medical attention.

Skin: Remove contaminated clothing and wash contaminated skin with large amounts of soap and water. If irritation persists, get medical attention. Launder clothing before reuse.

Inhalation: Remove to fresh air. If breathing has stopped, apply artificial respiration. If breathing is difficult, give oxygen provided a qualified operator is available. Get medical attention.

Ingestion: Notes to Physician: This product contains methanol which can cause intoxication and central nervous system depression. Methanol is metabolized to formic acid and formaldehyde. These metabolites can cause metabolic acidosis, visual disturbances and blindness. Since metabolism is required for these toxic symptoms, their onset may be delayed from 6 to 30 hours following ingestion. Ethanol competes for the same metabolic pathway and has been used to prevent methanol metabolism. Ethanol administration is indicated in symptomatic patients or at blood hemodialysis. Preexisting disorders of the following organs (or organ systems) may be aggravated by exposure to this material: skin, lung (for example, asthma-like conditions), liver, kidney, central nervous system, pancreas, heart). Exposure to this material may aggravate any preexisting condition sensitive to a decrease in available oxygen, such as chronic lung disease, coronary artery disease or anemias.

If swallowed, induce vomiting of conscious patient immediately by giving two glasses of water and pressing finger down throat. Drink a large amount of water, milk or sodium bicarbonate to dilute material in stomach. (Never give anything by mouth to an unconscious person.) Call Poison Control Center, hospital emergency room or physician immediately.

5. FIRE FIGHTING MEASURES

FIRE & EXPLOSION HAZARD DATA

Flammable Properties

Flash Point:	130° F
Method Used:	Open cup

Flammability Limits - % of vapor concentration at which methanol can ignite in presence of spark.

LEL: 6.0%
UEL: 36.0%

Hazardous Combustion Products: Methanol

Extinguishing Media: Foam, dry chemical, carbon dioxide or any Class B extinguishing agent. Water may be unsuitable as an extinguishing medium but helpful in keeping adjacent containers cool

Fire Fighting Instructions: Use water spray to cool fire exposed containers.

Water may be ineffective but may be used to cool exposed containers to prevent pressure buildup and possible auto-ignition or explosion when exposed to extreme heat. If water is used, fog nozzles are preferable.

Unusual Fire and Explosion Hazards: Handle as flammable liquid. Vapors are heavier than air and may travel along the ground or may be moved by ventilation. Vapors form an explosive mixture in air between the upper and lower explosive limits which can be ignited by many sources, such as pilot lights, open flames, electrical motors and switches.

Protective Equipment For Fire Fighters: Wear NIOSH approved self-contained breathing apparatus with full face piece and protective clothing to prevent contact with skin and eyes.

6. ACCIDENTAL RELEASE MEASURES

Small Spill

Absorb liquid on vermiculite, floor absorbent or other absorbent material.

Large Spill

Eliminate all ignition sources (flares, flames including pilot lights, electrical sparks). Persons not wearing protective equipment should be excluded from area of spill until clean-up has been completed. Stop spill at source. Prevent from entering drains, sewers, streams or other bodies of water. Prevent from spreading. If runoff occurs, notify authorities as required. Pump or vacuum transfer spilled product to clean containers for recovery. Absorb unrecoverable product. Transfer contaminated absorbent, soil and other materials to containers for disposal. Prevent run-off to sewers, streams or other bodies of water. If run-off occurs, notify proper authorities as required, that a spill has occurred.

7. HANDLING AND STORAGE

Do not swallow. Store in closed containers in a cool, dry, well-ventilated area. Keep away from sparks and open flame.

Respiratory Protection: Use approved NIOSH respirator when TLV is exceeded.

Ventilation: Provide sufficient ventilation to maintain exposure below TLV.

Protective Gloves: Wear appropriate impermeable gloves.

Eye Protection: Use chemical safety glasses, goggles and face shields for eye protection.

Other Protective Clothing or Equipment: Long sleeves and apron are recommended.

Work / Hygienic Practices: Avoid prolonged or repeated skin contact.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

Eye Protection:

Chemical splash goggles in compliance with OSHA regulations are advised; however, OSHA regulations also permit other type safety glasses. Consult your safety representative.

Skin Protection:

Wear resistant gloves (consult your safety equipment supplier). To prevent repeated or prolonged skin contact, wear impervious clothing and boots.

Respiratory Protection:

If workplace exposure limit(s) of product or any component is exceeded (see exposure guidelines), a NIOSH/MSHA approved air supplied respiratory is advised in absence of proper environmental control. OSHA regulations also permit other NIOSH/MSHA respirators (negative pressure type) under specified conditions (see your industrial hygienist). Engineering or administrative controls should be implemented to reduce exposure.

Engineering Controls:

Provide sufficient mechanical (general and/or local exhaust) ventilation to maintain exposure below TLV(s).

Exposure Guidelines:

Component

Methyl Alcohol (67-56-1)

OSHA VPEL 200.000 ppm – TWA (skin)

OSHA VPEL 250.000 ppm – STEL (skin)

ACGIH TLV 200.000 ppm – TWA (skin)

ACGIH TLV 250.000 ppm – STEL (skin)

9. PHYSICAL AND CHEMICAL PROPERTIES

Boiling Range:	196°F - 198° F
Specific Gravity (Water =1):	.98 @ 20° C
Vapor Pressure (mm of Hg):	28 @ 20° C
Vapor Density (Air=1):	Heavier than air
Water Solubility:	Soluble
Appearance:	Clear blue liquid
Odor:	Mild alcohol odor
Evaporation Rate:	Greater than m-butyl acetate

10. STABILITY AND REACTIVITY

Stability: Stable

Conditions to Avoid: Ignition sources, such as heat, sparks and flames

Incompatibility (Materials to Avoid): Strong acids and strong oxidizing agents

Hazardous Decomposition Products: Burning can produce carbon monoxide and/or carbon dioxide. Carbon monoxide is highly toxic if inhaled; carbon dioxide in sufficient concentrations can act as an asphyxiant.

Hazardous Polymerization: Will not occur

11. TOXICOLOGICAL INFORMATION

Mutagenicity (The Effects On Genetic Material):

Genotoxicity:

Methanol was negative for cell transformation in Syrian hamster embryo cells (clonal assay and viral enhanced), sister chromatid exchange in vitro, and for aneuploidy and chromosome aberrations in *Neurospora crassa* (GENETOX 1992). The micronucleus test and the assay for chromosome aberrations in mammalian polychromatic erythrocytes were inconclusive (GENETOX 1992).

Developmental/Reproductive Toxicity:

No information was found on the developmental toxicity of methanol in humans. Methanol can cause adverse effects in the developing offspring in rats at doses that cause overt maternal intoxication.

1. Humans – No information was found in the secondary sources searched regarding the developmental or reproductive toxicity of methanol to humans. However, one of the breakdown products of the artificial sweetener aspartame is methanol. Increased blood methanol levels did not lead to increased formic acid levels in women receiving up to 200 mg/kg aspartame (no other details reported) and no evidence of fetal risk was detected (HSDB 1994).
2. Animals – Rats were exposed by inhalation, 7 hours/day, to 5,000 or 10,000 ppm methanol on gestation days 1-19 or to 20,000 ppm on days 7-15. Maternal intoxication (unsteadiness) occurred at the highest dose and coincided with extra or rudimentary ribs and urinary or cardiovascular defects in the fetuses (ACGIH 1991). Male rats had significantly lowered testosterone levels after inhalation exposure to 200 ppm methanol for 6 weeks; at 10,000 ppm a change in luteinizing hormone was also observed (HSDB 1994).

Neurotoxicity:

Methanol causes central nervous system depression in humans and animals as well as degenerative changes in the brain and visual system.

1. Humans – Methanol causes narcosis similar to ethanol intoxication and nonlethal doses can lead to blindness. Autopsy of individuals after lethal doses revealed edema and hyperemia of the brain and degeneration of the ganglion cells of the retina (Rowe and McCollister 1981).

2. Animals – Acute methanol intoxication in animals causes CNS depression as observed by narcosis, incoordination, lethargy, drowsiness, and prostration (Rowe and McCollister 1981).

Significant Data With Possible Relevance To Humans:

Pharmacokinetics:

1. Absorption – Methanol is readily absorbed after oral, inhalation, or dermal exposure. Oral doses in humans of 71 to 84 mg/kg resulted in blood levels of 4.7 to 7.6 mg/100 mL of blood within 3 hours (Rowe and McCollister 1981). Inhalation of 500 to 1,000 ppm methanol for 3 to 4 hours gave urine concentrations of 1 to 3 mg methanol/100 mL of urine at the end of exposure (Rowe and McCollister 1981). Based on urinary methanol levels, the rate of absorption of the chemical appears to be proportional to the concentration of vapor inhaled (HSDB 1994). The rate of dermal absorption increased for 35 minutes then decreased over the next 25 minutes (no other details given) (HSDB 1994).
2. Distribution – Methanol distributes rapidly in dogs exposed to 4,000 to 15,000 ppm for 12 hours to 5 days; the highest concentrations of the chemical were found in blood, eye fluid, bile, and urine (HSDB 1994).
3. Metabolism – Methanol is oxidized in the human liver by the enzyme alcohol dehydrogenase (Rowe and McCollister 1981). Metabolic products include formaldehyde and formic acid (HSDB 1994). The rate of metabolism for methanol (25 mg/kg/hr) is much slower than for ethanol (175 mg/kg/hr) and is independent of concentrations in the blood (HSDB 1994). Formic acid is responsible for the toxic effects of methanol (ACGIH 1991).
4. Excretion – Methanol is excreted either as parent compound in the urine or expired air, or as the formic acid metabolite in urine (Rowe and McCollister 1981; HSDB 1994). The amount of formic acid excreted varies greatly with species from 1% in rabbits to 20% in dogs; humans are intermediate (HSDB 1994). In humans, the half-life of methanol elimination in expired air after oral or dermal exposure is 1.5 hours (HSDB 1994).

12. ECOLOGICAL INFORMATION

ENVIRONMENTAL FATE

Methanol evaporates when exposed to air. It dissolves completely when mixed with water. Most direct releases of methanol to the environment are to air. Methanol also evaporates from water and soil exposed to air. Once in air, it breaks down to other chemicals. Microorganisms that live in water and in soil can also break down methanol. Because it is a liquid that does not bind well to soil, methanol that makes it way into the ground can move through the ground and enter groundwater. Plants and animals are not likely to store methanol.

Methanol by itself is not likely to cause environmental harm at levels normally found in the environment. Methanol can contribute to the formation of photochemical smog when it reacts with other volatile organic carbon substances in air.

Movement & Partitioning:

The miscibility of methanol in water and a low KOC (9) indicate that the chemical will be highly mobile in soil (HSDB 1994). Volatilization half-lives from a model river and an environmental pond were estimated at 4.8 days and 51.7 days, respectively (HSDB 1994). Methanol can be removed from the atmosphere in rain water (HSDB 1994).

Degradation & Transformation:

1. Air – Once in the atmosphere, methanol exists in the vapor phase with a half life of 17.8 days (HSDB 1994). The chemical reacts with photochemically produced hydroxyl radicals to produce formaldehyde (HSDB 1994). Methanol can also react with nitrogen dioxide in polluted air to form methyl nitrite (HSDB 1994).
2. Soil – Biodegradation is the major route of removal of methanol from soils. Several species of *Methylobacterium* and *Methylomonas* isolated from soils are capable of utilizing methanol as a sole carbon source (CHEMFATE 1994).
3. Water – Most methanol is removed from water by biodegradation. The degradation products of methane and carbon dioxide were detected from aqueous cultures of mixed bacteria isolated from sewage sludge (CHEMFATE 1994). Aerobic, Gram-negative bacteria (65 strains) isolated from seawater, sand, mud, and weeks of marine origin utilized methanol as a sole carbon source (CHEMFATE 1994). Aquatic hydrolysis, oxidation, and photolysis are not significant fate processes for methanol (HSDB 1994).
4. Biota – Bioaccumulation of methanol in aquatic organisms is not expected to be significant based on an estimated bioconcentration factor of 0.2 (HSDB 1994).

Ecotoxicology:

1. Toxicity to Aquatic Organisms – Methanol has low acute toxicity to aquatic organisms; lethal concentrations are much greater than 100 mg/L. Ninety-six hour LC50 values for fish are 28,100 mg/L for *Pimephales promelas* (fathead minnow), 20,100 mg/L for *Oncorhynchus mykiss* (rainbow trout), and >28,000 mg/L for *Alburnus alburnus* (bleak) (AQUIRE 1994). Forty-eight hour LC50 values for *Cyprinus carpio* (common carp) and *Carassius auratus* (goldfish) are 28,000 mg/L and 1,700 mg/L, respectively (AWQUIRE 1994). Growth inhibition occurred for 4 strains of *Anabaena* (blue-green algae) over a range of EC50s of 2.57%-3.13% for 10-14 days (AQUIRE 1994). The LC50 for *Artemia salina* (brine shrimp) is >10,000 mg/L in 24 hours and that for *Culex restuans* (mosquito) is 20,000 mg/L in 18 hours (AQUIRE 1994).
2. Toxicity to Terrestrial Organisms – No information was found in the secondary sources searched regarding the toxicity of methanol to terrestrial organisms. However, based on the range of oral LD50s, 0.4 to 14.2 g/kg, for monkeys, rats, mice, and rabbits (Rowe and McCollister 1981), it is unlikely that methanol would be toxic to terrestrial animals at environmental levels.
3. Abiotic Effects – Methanol reacts with nitrogen dioxide in polluted atmospheres to produce methyl nitrite (HSDB 1994). According to the definition provided in the Federal Register (1992), methanol is a volatile organic compound (VOC) substance. As a VOC, methanol can contribute to the formation of photochemical smog in the presence of other VOCs.

13. DISPOSAL CONSIDERATIONS

Waste Disposal Method: Dispose in accordance with federal, state and local regulations.

14. TRANSPORT INFORMATION

(U.S. D.O.T.) – U. S. Department of Transportation

Not regulated according to 49 CFR 173.116 (b) (3)

(IATA) International Air Dangerous Good Regulations

Proper Shipping Name: Flammable Liquid, n.o.s. (Methanol)
ID #: UN 1993
Class: 3
Hazard Label: Flammable Liquid
PG: III
Ltd. Qty. Packaging Instruction: Y309 (Max qty. per package 10L)
Special Provision: A3

(IMDG) International Maritime Dangerous Goods

Not IMDG regulated according to IMDG Code – Page 3003 Part 1.1.1

15. REGULATORY INFORMATION

THIS PRODUCT CONTAINS COMPONENT(S) CITED ON THE FOLLOWING REGULATIONS:

<u>CHEMICAL NAME</u>	<u>CAS NUMBER</u>
Methanol	67-56-1

U.S. Federal Regulations

TSCA (Toxic Substances Control Act) Status – TSCA (UNITED STATES)

The intentional ingredients of this product are listed.

CERCLA RQ – 40 CFR 302.4(a)

<u>Component</u>	<u>RQ (lbs)</u>
Methyl Alcohol	5,000

SARA 302 Components – 40 CFR 355 Appendix A

None

Section 311/312 Hazard Class – 40 CFR 370.2

Immediate (X) Delayed (X) Fire (X) Reactive () Sudden Release of Pressure ()

SARA 313 Components – 40 CFR 372.65

<u>Section 313 Component(s)</u>	<u>CAS Number</u>	<u>%</u>
Methanol	67-56-1	8

International Regulations

Inventory Status – DSL (CANADA)

The intentional ingredients of this product are listed.

WHMIS Information: B2, D1A

ECL (SOUTH KOREA)

The intentional ingredients of this product are listed.

EINECS (EUROPE)

The intentional ingredients of this product are listed.

ENCS (JAPAN)

The intentional ingredients of this product are listed.

State and Local Regulations – California Proposition 65

None

New Jersey RTK (Right-to-Know) Label Information

Methyl Alcohol 67-56-1

Pennsylvania RTK (Right-to-Know) Label Information

Methanol 67-56-1

Atmospheric Standards: The Clean Air Act Amendments of 1990 list methanol as a hazardous air pollutant.

16. OTHER INFORMATION

Contact: Tom Cholke

Phone: (847) 559-2225

Old World Industries, Inc. makes no warranty, representation or guarantee as to the accuracy, sufficiency or completeness of the material set forth herein. It is the user's responsibility to determine the safety, toxicity and suitability of his own use, handling and disposal of this product. Since actual use by others is beyond our control, no warranty, expressed or implied, is made by Old World Industries, Inc. as to the effects of such use, the results to be obtained or the safety and toxicity of this product, nor does Old World Industries, Inc. assume liability arising out of the use by others of this product referred to herein. The data in this MSDS relates only to the specific material designated herein and does not relate to use in combination with any other material or in any process.

Cements

MATERIAL SAFETY DATA SHEET (Complies with OSHA 29 CFR 1910.1200)

SECTION I: PRODUCT IDENTIFICATION

The QUIKRETE® Companies	Emergency Telephone Number
One Securities Centre	(770) 216-9580
3490 Piedmont Road, Suite 1300	
Atlanta, GA 30329	Information Telephone Number
	(770) 216-9580

MSDS K1
Revision: Feb-07

<u>QUIKRETE® Product Name</u>	<u>Code #</u>
QUIKRETE® PORTLAND CEMENT	1124
PORTLAND/POZZOLAN CEMENT	1118-35

HEALTH		1
FLAMMABILITY		0
PHYSICAL HAZARD		0
PERSONAL PROTECTION Safety Glasses, Gloves and Dust Respirator		

PRODUCT USE: HYDRAULIC CEMENTS FOR GENERAL CONSTRUCTION AND REPAIR

SECTION II - HAZARD IDENTIFICATION

Route(s) of Entry: Inhalation, Skin, Ingestion

Acute Exposure: Product becomes alkaline when exposed to moisture. Exposure can dry the skin, cause alkali burns and affect the mucous membranes. Dust can irritate the eyes and upper respiratory system. Toxic effects noted in animals include, for acute exposures, alveolar damage with pulmonary edema.

Chronic Exposure: Dust can cause inflammation of the lining tissue of the interior of the nose and inflammation of the cornea. Hypersensitive individuals may develop an allergic dermatitis.

Carcinogenicity: Since Portland cement and blended cements are manufactured from raw materials mined from the earth (limestone, marl, sand, shale, etc.) and process heat is provided by burning fossil fuels, trace, but detectable, amounts of naturally occurring, and possibly harmful, elements may be found during chemical analysis. Under ASTM standards, Portland cement may contain 0.75 % insoluble residue. A fraction of these residues may be free crystalline silica. Respirable crystalline silica (quartz) can cause silicosis, a fibrosis (scarring) of the lungs and possibly cancer. There is evidence that exposure to respirable silica or the disease silicosis is associated with an increased incidence of Scleroderma, tuberculosis and kidney disorders.

Carcinogenicity Listings:	NTP:	Known carcinogen
	OSHA:	Not listed as a carcinogen
	IARC Monographs:	Group 1 Carcinogen

California Proposition 65: Known carcinogen

NTP: The National Toxicology Program, in its "Ninth Report on Carcinogens" (released May 15, 2000) concluded that "Respirable crystalline silica (RCS), primarily quartz dusts occurring in industrial and occupational settings, is *known to be a human carcinogen*, based on sufficient evidence of carcinogenicity from studies in humans indicating a causal relationship between exposure to RCS and increased lung cancer rates in workers exposed to crystalline silica dust (reviewed in IAC, 1997; Brown *et al.*, 1997; Hind *et al.*, 1997)

IARC: The International Agency for Research on Cancer ("IARC") concluded that there was "*sufficient evidence* in humans for the carcinogenicity of crystalline silica in the forms of quartz or cristobalite from occupational sources", and that there is "*sufficient evidence* in experimental animals for the carcinogenicity of quartz or cristobalite." The overall IARC evaluation was that "crystalline silica inhaled in the form of quartz or cristobalite from occupational sources is *carcinogenic to humans* (Group 1)." The IARC evaluation noted that "carcinogenicity was not detected in all industrial circumstances or studies. Carcinogenicity may be dependent on inherent characteristics of the crystalline silica or on external factors affecting its biological activity or distribution of its polymorphs." For further information on the IARC evaluation, see IARC Monographs on the Evaluation of carcinogenic Risks to Humans, Volume 68, "Silica, Some Silicates." (1997)

Signs and Symptoms of Exposure: Symptoms of excessive exposure to the dust include shortness of breath and reduced pulmonary function. Excessive exposure to skin and eyes especially when mixed with water can cause caustic burns as severe as third degree.

Medical Conditions Generally Aggravated by Exposure: Individuals with sensitive skin and with pulmonary and/or respiratory disease, including, but not limited to, asthma and bronchitis, or subject to eye irritation, should be precluded from exposure. Exposure to crystalline silica or the disease silicosis is associated with increased incidence of scleroderma, Tuberculosis and possibly increased incidence of kidney lesions.

Chronic Exposure: Dust can cause inflammation of the lining tissue of the interior of the nose and inflammation of the cornea. Hypersensitive individuals may develop an allergic dermatitis. (May contain trace (<0.05 %) amounts of chromium salts or compounds including hexavalent chromium, or other metals found to be hazardous or toxic in some chemical forms. These metals are mostly present as trace substitutions within the principal minerals)

Medical Conditions Generally Aggravated by Exposure: Individuals with sensitive skin and with pulmonary and/or respiratory disease, including, but not limited to, asthma and bronchitis, or subject to eye irritation, should be precluded from exposure.

SECTION III - HAZARDOUS INGREDIENTS/IDENTITY INFORMATION

Hazardous Components	CAS No.	PEL (OSHA) mg/M ³	TLV (ACGIH) mg/M ³
Portland Cement May contain:	65997-15-1	5	5

CEMENT & CONCRETE PRODUCTS™

Silica Sand, crystalline	14808-60-7	$\frac{10}{\%SiO_2+2}$	0.05 (respirable)
Pulverized Limestone	01317-65-3	5	5
Fly Ash	68131-74-8	5	5
Gypsum	10101-41-4	5	5
Lime	01305-62-0	5	5

Although these products contain no intentionally added Silica, they may contain small amounts of silica occurring as natural impurities in the other raw materials.

Other Limits: National Institute for Occupational Safety and Health (NIOSH). Recommended standard maximum permissible concentration=0.05 mg/M³ (respirable free silica) as determined by a full-shift sample up to 10-hour working day, 40-hour work week. See NIOSH Criteria for a Recommended Standard Occupational Exposure to Crystalline Silica.

SECTION IV – First Aid Measures

Eyes: Immediately flush eye thoroughly with water. Continue flushing eye for at least 15 minutes, including under lids, to remove all particles. Call physician immediately.

Skin: Wash skin with cool water and pH-neutral soap or a mild detergent. Seek medical treatment if irritation or inflammation develops or persists. Seek immediate medical treatment in the event of burns.

Inhalation: Remove person to fresh air. If breathing is difficult, administer oxygen. If not breathing, give artificial respiration. Seek medical help if coughing and other symptoms do not subside. Inhalations of large amounts of Portland cement require immediate medical attention.

Ingestion: Do not induce vomiting. If conscious, have the victim drink plenty of water and call a physician immediately.

SECTION V - FIRE AND EXPLOSION HAZARD DATA

Flammability: Noncombustible and not explosive.

Auto-ignition Temperature: Not Applicable

Flash Points: Not Applicable

SECTION VI – ACCIDENTAL RELEASE MEASURES

If spilled, use dustless methods (vacuum) and place into covered container for disposal (if not contaminated or wet). Use adequate ventilation to keep exposure to airborne contaminants below the exposure limit.

SECTION VII - PRECAUTIONS FOR SAFE HANDLING AND STORAGE

Do not allow water to contact the product until time of use. **DO NOT BREATHE DUST.** In dusty environments, the use of an OSHA, MSHA or NIOSH approved respirator and tight fitting goggles is recommended.

SECTION VIII – EXPOSURE CONTROL MEASURES

Engineering Controls: Local exhaust can be used, if necessary, to control airborne dust levels.

Personal Protection: The use of barrier creams or impervious gloves, boots and clothing to protect the skin from contact is recommended. Following work, workers should shower with soap and water. Precautions must be observed because burns occur with little warning -- little heat is sensed.

WARN EMPLOYEES AND/OR CUSTOMERS OF THE HAZARDS AND REQUIRED OSHA PRECAUTIONS ASSOCIATED WITH THE USE OF THIS PRODUCT.

Exposure Limits: Consult local authorities for acceptable exposure limits

SECTION IX - PHYSICAL/CHEMICAL CHARACTERISTICS

Appearance: Gray to gray-brown colored powder. Some products available in white and other colors.

Specific Gravity: 2.6 to 3.15

Boiling Point: >2700°F

Vapor Density: Not Applicable

Solubility in Water: Slight

Melting Point:

Vapor Pressure:

Evaporation Rate:

Odor:

>2700°F

Not Applicable

Not Applicable

Not Applicable

SECTION X - REACTIVITY DATA

Stability: Stable.

Incompatibility (Materials to Avoid): Material when mixed with water will react with Aluminum and other alkali and alkaline earth elements liberating hydrogen gas.

Hazardous Decomposition or By-products: None

Hazardous Polymerization: Will Not Occur.

Condition to Avoid: Keep dry until used to preserve product utility.

SECTION XI – TOXICOLOGICAL INFORMATION

Routes of Entry: Inhalation, Ingestion

Toxicity to Animals:

LD50: Not Available

LC50: Not Available

Chronic Effects on Humans: Conditions aggravated by exposure include eye disease, skin disorders and Chronic Respiratory conditions.

Special Remarks on Toxicity: Not Available

SECTION XII – ECOLOGICAL INFORMATION

Ecotoxicity: Not Available

CEMENT & CONCRETE PRODUCTS™**BOD5 and COD:** Not Available**Products of Biodegradation:** Not available**Toxicity of the Products of Biodegradation:** Not available**Special Remarks on the Products of Biodegradation:** Not available

SECTION XIII – DISPOSAL CONSIDERATIONS

Waste Disposal Method: The packaging and material may be land filled; however, material should be covered to minimize generation of airborne dust. This product is not classified as a hazardous waste under the authority of the RCRA (40CFR 261) or CERCLA (40CFR 117&302).

SECTION XIV – TRANSPORT INFORMATION

DOT/UN Shipping Name: Non-regulated**DOT Hazard Class:** Non-regulated**Shipping Name:** Non-regulated

Non-Hazardous under U.S. DOT and TDG Regulations

SECTION XV – OTHER REGULATORY INFORMATION

US OSHA 29CFR 1910.1200: Considered hazardous under this regulation and should be included in the employers hazard communication program

SARA (Title III) Sections 311 & 312: Qualifies as a hazardous substance with delayed health effects

SARA (Title III) Section 313: Not subject to reporting requirements

TSCA (May 1997): All components are on the TSCA inventory list

Federal Hazardous Substances Act: Is a hazardous substance subject to statutes promulgated under the subject act

Canadian Environmental Protection Act: Not listed

Canadian WHMIS Classification: Considered to be a hazardous material under the Hazardous Products Act as defined by the Controlled Products Regulations (Class D2A, E- Corrosive Material) and subject to the requirements of Health Canada's Workplace Hazardous Material Information (WHMIS). This product has been classified according to the hazard criteria of the Controlled Products Regulation (CPR). This document complies with the WHMIS requirements of the Hazardous Products Act (HPA) and the CPR.

SECTION XVI – OTHER INFORMATION

HMIS-III:

Health –	0 = No significant health risk
	1 = Irritation or minor reversible injury possible
	2 = Temporary or minor injury possible
	3 = Major injury possible unless prompt action is taken
	4 = Life threatening, major or permanent damage possible
Flammability-	0 = Material will not burn
	1 = Material must be preheated before ignition will occur

Physical Hazard-	2 = Material must be exposed to high temperatures before ignition
	3 = Material capable of ignition under normal temperatures
	4 = Flammable gases or very volatile liquids; may ignite spontaneously
	0 = Material is normally stable, even under fire conditions
	1 = Material normally stable but may become unstable at high temps
	2 = Materials that are unstable and may undergo react at room temp
	3 = Materials that may form explosive mixtures with water
	4 = Materials that are readily capable of explosive water reaction

Abbreviations:

ACGIH	American Conference of Government Industrial Hygienists
CAS	Chemical Abstract Service
CERCLA	Comprehensive Environmental Response, Compensation & Liability Act
CFR	Code of Federal Regulations
CPR	Controlled Products Regulations (Canada)
DOT	Department of Transportation
IARC	International Agency for Research
MSHA	Mine Safety and Health Administration
NIOSH	National Institute for Occupational Safety and Health
NTP	National Toxicity Program
OSHA	Occupational Safety and Health Administration
PEL	Permissible Exposure Limit
RCRA	Resource Conservation and Recovery Act
SARA	Superfund Amendments and Reauthorization Act
TLV	Threshold Limit Value
TWA	Time-weighted Average
WHMIS	Workplace Hazardous Material Information System

Revision #07-01, supersedes all previous revisions

Created: 10/25/2006

Last Updated: February 6, 2007

NOTE: The information and recommendations contained herein are based upon data believed to be correct. However, no guarantee or warranty of any kind, express or implied, is made with respect to the information contained herein. We accept no responsibility and disclaim all liability for any harmful effects which may be caused by exposure to silica contained in our products.

MATERIAL SAFETY DATA SHEET FOR ODORIZED PROPANE

1. Chemical Product and Company Identification

Product Name: Odorized Propane
Chemical Name: Propane
Chemical Family: Paraffinic Hydrocarbon
Formula: C₃H₈
Synonyms: Dimethylmethane, LP-Gas, Liquefied Petroleum Gas (LPG), Propane, Propyl Hydride

Name & Address:	Transportation Emergency Number:	Emergency Number: For Routine Info, Call:
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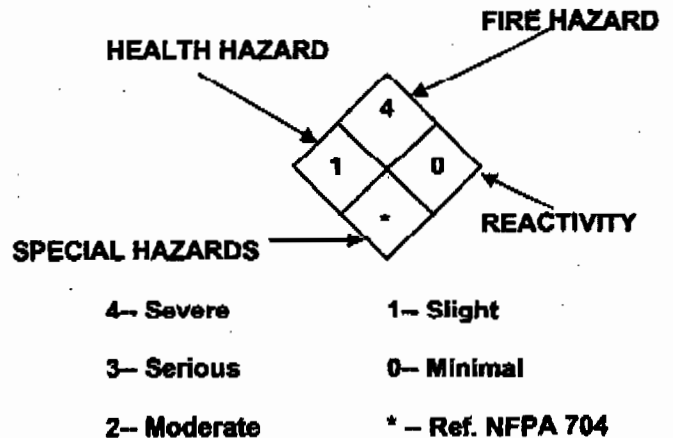
2. Composition/Information on Ingredients

Ingredient Name /CAS Number	Percentage	OSHA PEL	ACGIH TLV
Propane/74-98-6.....	87.5-100	1,000 ppm	Simple asphyxiant
Ethane/74-84-0.....	0-5.0		Simple asphyxiant
Propylene/115-07-1.....	0-10.0		Simple asphyxiant
Butanes/various.....	0-2.5		Simple asphyxiant
Ethyl Mercaptan/75-08-1.....	16-25ppm	0.5 ppm	0.5 ppm

3. Hazards Identification

EMERGENCY OVERVIEW

DANGER! Flammable liquefied gas under pressure. Keep away from heat, sparks, flame, and other ignition sources. Vapor replaces oxygen available for breathing and may cause suffocation in confined spaces. Use only with adequate ventilation. Odor may not provide adequate warning of potentially hazardous concentrations. Vapor is heavier than air. Liquid can cause freeze burn similar to frostbite. Do not get liquid in eyes, on skin, or on clothing. Avoid breathing of vapor. Keep container valve closed when not in use.



POTENTIAL HEALTH EFFECTS INFORMATION:

ROUTES OF EXPOSURE:

Inhalation: Asphyxiant. It should be noted that before suffocation could occur, the lower flammability limit of propane in air would be exceeded, possibly causing both an oxygen-deficient and explosive atmosphere. Exposure to concentrations >10% may cause dizziness. Exposure to atmospheres containing 8%-10% or less oxygen will bring about unconsciousness without warning, and so quickly that the individuals cannot help or protect themselves. Lack of sufficient oxygen may cause serious injury or death.

Eye Contact: Contact with liquid can cause freezing of tissue.

Skin Contact: Contact with liquid can cause frostbite.

[Skin Absorption]: None.

[Ingestion]: Liquid can cause freeze burn similar to frostbite. Ingestion not expected to occur in normal use.

CHRONIC EFFECTS: None

MEDICAL CONDITIONS AGGRAVATED BY OVEREXPOSURE: None

OTHER EFFECTS OF OVEREXPOSURE: None

CARCINOGENICITY: Propane is not listed by NTP, OSHA or IARC.

4. First Aid Measures

INHALATION: Persons suffering from lack of oxygen should be removed to fresh air. If victim is not breathing, administer artificial respiration. If breathing is difficult, administer oxygen. Obtain prompt medical attention.

EYE CONTACT: Contact with liquid can cause freezing of tissue. Gently flush eyes with lukewarm water. Obtain medical attention immediately.

SKIN CONTACT: Contact with liquid can cause frostbite. Remove saturated clothes, shoes and jewelry. Immerse affected area in lukewarm water not exceeding 105. F. Keep immersed. Get prompt medical attention.

INGESTION: If swallowed, get immediate medical attention.

NOTES TO PHYSICIAN: None.

5. Fire-Fighting Measures

FLASH POINT: -156° F (-104° C)

AUTOIGNITION: 842° F (432° C)

IGNITION TEMPERATURE IN AIR: 920-1120° F

FLAMMABLE LIMITS IN AIR BY VOLUME: Lower: 2.15% Upper: 9.6%

EXTINGUISHING MEDIA: Dry chemical, CO2, water spray or fog for surrounding area. Do not extinguish fire until propane source is shut off.

SPECIAL FIRE-FIGHTING INSTRUCTIONS: Evacuate personnel from danger area. Immediately cool container with water spray from maximum distance, taking care not to extinguish flames. If flames are accidentally extinguished, explosive re-ignition may occur. Where water is abundant and immediate, the fire should be allowed to burn while the container and area are cooled and the flow of propane is shut off. Where water is scarce, compare the risk of allowing the area to continue to heat from the fire and the alternative of extinguishing the fire without shutting off the propane flow, which may allow for the propane to accumulate and re-ignite explosively.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Propane is easily ignited. It is heavier than air; therefore, it can collect in low areas where an ignition source can be present. Pressure in a container can build up due to heat and container may

rupture if pressure relief devices should fail to function. Propane released from a properly functioning relief valve on an overheated container can also become ignited.

HAZARDOUS COMBUSTION PRODUCTS: None.

6. Accidental Release Measures

STEPS TO BE TAKEN IF MATERIAL IS RELEASED OR SPILLED: Evacuate the immediate area. Eliminate any possible sources of ignition and provide maximum ventilation. Shut off source of propane, if possible. If leaking from container, or valve, contact your supplier.

7. Handling and Storage

HANDLING PRECAUTIONS: Propane vapor is heavier than air and can collect in low areas that are without sufficient ventilation. Leak-check system with a leak detector or solution, never with flame. Make certain the container service valve is shut off prior to connecting or disconnecting. If container valve does not operate properly, discontinue use and contact supplier. Never insert an object (e.g. wrench, screwdriver, pry bar, etc.) into pressure relief valve or cylinder valve cap openings. Do not drop or abuse cylinders. Never strike an arc on a gas container or make a container part of an electrical circuit. See "16. OTHER INFORMATION" for additional precautions.

STORAGE PRECAUTIONS: Store in a safe, authorized location (outside, detached storage is preferred) with adequate ventilation. Specific requirements are listed in NFPA 58, *Standard for the Storage and Handling of Liquefied Petroleum Gases*. Isolate from heat and ignition sources. Containers should never be allowed to reach temperature exceeding 125° F (52° C). Isolate from combustible materials. Provide separate storage locations for other compressed and flammable gases. Propane containers should be separated from oxygen cylinders, or other oxidizers, by a minimum distance of 20 feet, or by a barrier of non-combustible material at least 5 feet high having a fire rating of at least 1/2 hour. Full and empty cylinders should be segregated. Store cylinders in upright position, or with pressure relief valve in vapor space. Do not drop or abuse cylinders. Keep container valve closed and plugged or capped when not in use. Install protective caps when cylinders are not connected for use. Empty containers retain some residue and should be treated as if they were full.

8. Exposure Controls/Personal Protection

ENGINEERING CONTROLS

Ventilation: Provide ventilation adequate to ensure propane does not reach a flammable mixture.

RESPIRATORY PROTECTION (SPECIFY TYPE)

General Use: None.

Emergency Use: If concentrations are high enough to warrant supplied-air or self-contained breathing apparatus, then the atmosphere may be flammable. (See Section 5). Appropriate precautions must be taken regarding flammability.

PROTECTIVE CLOTHING: Avoid skin contact with liquid propane because of possibility of freeze burn. Wear gloves and protective clothing which are impervious to the product for the duration of the anticipated exposure.

EYE PROTECTION: Safety glasses are recommended when handling cylinders.

OTHER PROTECTIVE EQUIPMENT: Safety shoes are recommended when handling cylinders.

9. Physical and Chemical Properties

BOILING POINT: @ 14.7 psia = -44° F

SPECIFIC GRAVITY OF VAPOR (Air = 1) at 60° F: 1.50

SPECIFIC GRAVITY OF LIQUID (Water = 1) at 60° F: 0.504

VAPOR PRESSURE: @ 70° F = 127 psig
@ 105° F = 210 psig

EXPANSION RATIO (From liquid to gas @ 14.7 psia): 1 to 270

SOLUBILITY IN WATER: Slight, 0.1 to 1.0%

APPEARANCE AND ODOR: A colorless and tasteless gas at normal temperature and pressure.
An odorant (ethyl mercaptan) has been added to provide a strong unpleasant odor.
Should a propane-air mixture reach the lower limits of flammability, the ethyl mercaptan concentration will be approximately 0.5 ppm in air.

ODORANT WARNING: Odorant is added to aid in the detection of leaks. One common odorant is ethyl mercaptan, CAS No.75-08-01. Odorant has a foul smell. The ability of people to detect odors varies widely. Also, certain chemical reactions with material in the propane system, or fugitive propane gas from underground leaks passing through certain soils, can reduce the odor level. No odorant will be 100% effective in all circumstances. If odorant appears to be weak, notify propane supplier immediately.

10. Stability and Reactivity

STABILITY: Stable.

Conditions to Avoid: Keep away from high heat, strong oxidizing agents and sources of ignition.

REACTIVITY:

Hazardous Decomposition Products: Under fire conditions, fumes, smoke, carbon monoxide, aldehydes and other decomposition products. When used as an engine fuel, incomplete combustion can cause carbon monoxide, a toxic gas.

Hazardous polymerization: Will not occur.

11. Toxicological Information

Propane is non-toxic and is a simple asphyxiant, however, it does have slight anesthetic properties and higher concentrations may cause dizziness.

[IRRITANCY OF MATERIAL]: None

[SENSITIZATION TO MATERIAL]: None

[REPRODUCTIVE EFFECTS]: None

[TERATOGENICITY]: None

[MUTAGENICITY]: None

[SYNERGISTIC MATERIALS]: None

12. Ecological Information

No adverse ecological effects are expected. Propane does not contain any Class I or Class II ozone-depleting chemicals (40 CFR Part 82). Propane is not listed as a marine pollutant by DOT (49 CFR Part 171).

13. Disposal Considerations

WASTE DISPOSAL METHOD: Do not attempt to dispose of residual or unused product in the container. Return to supplier for safe disposal.

Residual product within process system may be burned at a controlled rate, if a suitable burning unit (flare stack) is available on site. This shall be done in accordance with federal, state and local regulations.

14. Transport Information

DOT SHIPPING NAME: Liquefied Petroleum Gas

IDENTIFICATION NUMBER: UN 1075

IMO SHIPPING NAME: Propane

IMO IDENTIFICATION NUMBER: UN 1978

HAZARD CLASS: 2.1 (Flammable Gas)

PRODUCT RQ: None **SHIPPING LABEL(S):** Flammable gas

PLACARD (WHEN REQUIRED): Flammable gas

SPECIAL SHIPPING INFORMATION: Container should be transported in a secure, upright position in a well-ventilated vehicle.

15. Regulatory Information

The following information concerns selected regulatory requirements potentially applicable to this product. Not all such requirements are identified. Users of this product are responsible for their own regulatory compliance on a federal, state [provincial] and local level.

U.S. FEDERAL REGULATIONS

EPA Environmental Protection Agency

CERCLA Comprehensive Environmental Response, Compensation and Liability Act of 1980
(40 CFR Parts 117 and 302)
Reportable Quantity (RQ): None

SARA Superfund Amendment and Reauthorization Act
*SECTION 302/304: Requires emergency planning on threshold planning quantities (TPQ) and release reporting based on reportable quantities (RQ) of EPA's extremely hazardous substances (40 CFR Part 355).

Extremely Hazardous Substances: None

Threshold Planning Quantity (TPQ): None

*SECTIONS 311/312: Require submission of material safety data sheets (MSDSs) and chemical inventory reporting with identification of EPA-defined hazard classes (40 CFR Part 370). The hazard classes for this product are:

IMMEDIATE: No PRESSURE: Yes
DELAYED: No REACTIVITY: No FLAMMABLE: Yes

*SECTION 313: Requires submission of annual reports of release of toxic chemicals that appear in 40 CFR Part 372.

Propane does not require reporting under Section 313.

40 CFR PART 68 Risk Management for Chemical Accidental Release

TSCA Toxic Substance Control Act
Propane is listed on the TSCA inventory.

OSHA Occupational Safety and Health Administration

29 CFR 1910.119: Process Safety Management of Highly Hazardous Chemicals.

FDA Food and Drug Administration
21 CFR 184.1655: Generally recognized as safe (GRAS) as a direct human food ingredient when used as a propellant, aerating agent and gas.

16. Other Information

SPECIAL PRECAUTIONS: Use piping and equipment adequately designed to withstand pressure to be encountered.

NFPA 58 *Standard for the Storage and Handling of Liquefied Petroleum Gases* and OSHA 29 CFR 1910.10 require that all persons employed in handling LP-gases be trained in proper handling and operating procedures, which the employer shall document. Contact your propane supplier to arrange for the required training. Allow only trained and qualified persons to install and service propane containers and systems.

WARNING: Be aware that with odorized propane the intensity of ethyl mercaptan stench (its odor) may fade due to chemical oxidation (in the presence of rust, air or moisture), adsorption or absorption. Some people have nasal perception problems and may not be able to smell the ethyl mercaptan stench. Leaking propane from underground gas lines may lose its odor as it passes through certain soils. While ethyl mercaptan may not impart the warning of the presence of propane in every instance, it is generally effective in a majority of situations. Familiarize yourself, your employees and customers with this warning, and other facts associated with the so-called "odor-fade" phenomenon. If you do not already know all the facts, contact your propane supplier for more information about odor, electronic gas alarms and other safety considerations associated with the handling, storage and use of propane.

ISSUE INFORMATION

Issue Date: 01/17/08

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MEMBER OF

NATIONAL PROPANE GAS ASSOCIATION

The purpose of this bulletin is to set forth general safety practices for the installation, operation, and maintenance of LP-Gas equipment. It is not intended to be an exhaustive treatment of the subject, and should not be interpreted as precluding other procedures, which would enhance safe LP-Gas operations. Issuance of this bulletin is not intended to nor should it be construed as an undertaking to perform services on behalf of any party either for their protection or for the protection of third parties. The National Propane Gas Association assumes no liability for reliance on the contents of this bulletin.

Section 1 - Chemical Product and Company Identification

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Material Name: Sodium Hydroxide

CAS Number: 1310-73-2

Chemical Formula: HNaO

Structural Chemical Formula: NaOH

EINECS Number: 215-185-5

ACX Number: X1000118-8

Synonyms: CAUSTIC SODA; CAUSTIC SODA,BEAD; CAUSTIC SODA,DRY; CAUSTIC SODA,FLAKE; CAUSTIC SODA,GRANULAR; CAUSTIC SODA,SOLID; HYDROXYDE DE SODIUM; LEWIS-RED DEVIL LYE; LYE; NATRIUMHYDROXID; NATRIUMHYDROXYDE; SODA LYE; SODA,CAUSTIC; SODA,HYDRATE; SODIO(IDROSSIDO DI); SODIUM HYDRATE; SODIUM HYDROXIDE; SODIUM HYDROXIDE,BEAD; SODIUM HYDROXIDE,DRY; SODIUM HYDROXIDE,FLAKE; SODIUM HYDROXIDE,GRANULAR; SODIUM HYDROXIDE,SOLID; SODIUM(HYDROXYDE DE); WHITE CAUSTIC

General Use: Component of alkali cleaners. Manufacture of soap, pulp and paper; rayon. Chemical manufacture. Neutralizing agent in petroleum refining; manufacture of aluminum, detergents, textile processing, refining of vegetable oils. Laboratory reagent, for organic fusion, etching of metal. Used for regenerating ion exchange resins, lye peeling of fruits and vegetables in the food industry.

Section 2 - Composition / Information on Ingredients

Name	CAS	%
sodium hydroxide	1310-73-2	>98

OSHA PEL

TWA: 2 mg/m³.

NIOSH REL

Ceiling: 2 mg/m³.

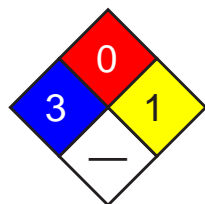
ACGIH TLV

Ceiling: 2 mg/m³.

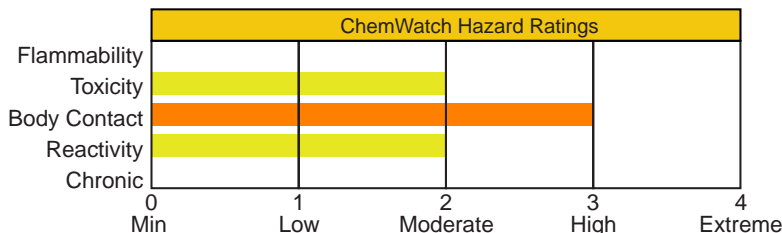
IDLH Level

10 mg/m³.

Section 3 - Hazards Identification



Fire Diamond



HMIS	
3	Health
1	Flammability
0	Reactivity

ANSI Signal Word

Danger!



Corrosive

☆☆☆☆☆ **Emergency Overview** ☆☆☆☆☆

White, odorless, hygroscopic flakes, lumps, or pellets. Corrosive, causes severe burns to eyes/skin/respiratory tract. Chronic Effects: dermatitis. Reacts with water.

Potential Health Effects

Target Organs: eyes, digestive system, respiratory system, skin

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

Acute Effects

Inhalation: Generated dust may be highly discomforting and corrosive to the upper respiratory tract if inhaled and is capable of causing severe burns to the upper respiratory tract.

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.

Severe acute dust inhalation exposure may be fatal due to spasm, inflammation and edema of the larynx and bronchi, chemical pneumonitis and severe pulmonary edema.

Symptoms of overexposure include burning sensation, coughing, wheezing, laryngitis, shortness of breath, headache, nausea and vomiting.

Eye: The solid/dust is extremely corrosive to the eyes and is capable of causing severe damage with loss of sight.

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

Skin: The solid/dust is highly discomforting and extremely corrosive to the skin and is capable of causing severe burns and ulceration.

Bare unprotected skin should not be exposed to this material. The material may produce severe 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.

Burns are not immediately painful; onset of pain may be delayed minutes or hours; thus care should be taken to avoid contamination of gloves and boots. A 5% aqueous solution applied to the skin of rabbits for 4 hours produced severe necrosis. Instillation of a 1% solution into the conjunctival sac failed to produce ocular or conjunctival injury in rabbits provided the eye was promptly irrigated with copious amounts of water.

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

The solid is extremely corrosive to the gastrointestinal tract and may be fatal if swallowed.

Ingestion may result in severe burns to the mouth, throat and stomach, pain, nausea and vomiting, swelling of the larynx and subsequent suffocation, perforation of the gastrointestinal tract.

A 1% aqueous solution (pH 13.4) failed to cause gastric, esophageal or other damage in rabbits.

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 contact is unlikely, given the severity of response, but repeated exposures may produce severe ulceration.

Section 4 - First Aid Measures

Inhalation: If dust is inhaled, remove to fresh air. Encourage patient to blow nose to ensure clear breathing passages. Ask patient to rinse mouth with water but to not drink water. Seek immediate medical attention.

Eye Contact: DO NOT delay. Immediately hold the eyes open and wash 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: DO NOT delay. 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.

In case of burns: Quickly immerse affected area in cold running water for 10 to 15 minutes. Bandage lightly with a sterile dressing. Treat for shock if required. Lay patient down. Keep warm and rested. Transport to hospital or doctor.

Ingestion: DO NOT delay. Contact a Poison Control Center. If swallowed, 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 highly alkaline materials:

1. Respiratory stress is uncommon but presents occasionally because of soft tissue edema.
2. Unless endotracheal intubation can be accomplished under direct vision, cricothyroidotomy or tracheotomy may be necessary.
3. Oxygen is given as indicated.
4. The presence of shock suggests perforation and mandates an intravenous line and fluid administration.
5. Alkali corrosives damage occurs by liquefaction necrosis whereby the saponification of fats and solubilization of proteins allow deep penetration into the tissue. Alkalis continue to cause damage after exposure.

INGESTION:

1. Milk and water are the preferred diluents. No more than 2 glasses of water should be given to an adult.
2. Neutralizing agents should never be given since exothermic heat reaction may compound injury.

* Catharsis and emesis are absolutely contra-indicated.

See
DOT
ERG

* Activated charcoal does not absorb alkali.

* Gastric lavage should not be used.

Supportive care involves the following.

1. Withhold oral feedings initially.
2. If endoscopy confirms transmucosal injury start steroids only within the first 48 hours.
3. Carefully evaluate the amount of tissue necrosis before assessing the need for surgical intervention.
4. Patients should be instructed to seek medical attention whenever they develop difficulty in swallowing (dysphagia).

SKIN AND EYE: Injury should be irrigated for 20-30 minutes. Eye injuries require saline.

Section 5 - Fire-Fighting Measures

Extinguishing Media: Use extinguishing media suitable for surrounding area.

General Fire Hazards/Hazardous Combustion Products: Noncombustible.

Not considered to be a significant fire risk, however containers may burn. Solid in contact with water or moisture reacts violently, and solutions are highly alkaline and may cause severe skin burns.

Fire Incompatibility: Avoid reaction with strong oxidizers, strong acids, organic materials/compounds.

In presence of moisture, the material is corrosive to aluminum, zinc and tin producing highly flammable hydrogen gas.

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.

Use fire fighting procedures suitable for surrounding area.

Do not approach containers suspected to be hot.

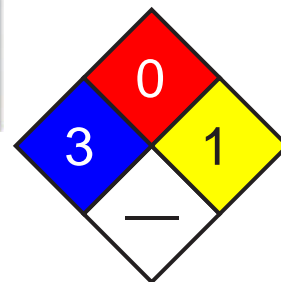
Cool fire exposed containers with water spray from a protected location.

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

Avoid spraying water onto liquid pools.

Equipment should be thoroughly decontaminated after use.

See
DOT
ERG



Fire Diamond

Section 6 - Accidental Release Measures

Small Spills: DO NOT touch the spill material. Slippery when spilt.

Clean up all spills immediately.

Control personal contact by using protective equipment.

Use dry clean up procedures and avoid generating dust.

Place in suitable containers for disposal.

Large Spills: DO NOT touch the spill material. Slippery when spilt.

Keep dry. Reacts violently with water.

Clear area of personnel and move upwind.

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.

Shut off all possible sources of ignition and increase ventilation.

Stop leak if safe to do so.

Use dry clean up procedures and avoid generating dust. Collect recoverable product into labeled containers for recycling. Collect residues and seal in labeled drums for disposal.

Wash area down with large quantity of water and prevent runoff into drains.

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.

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

See
DOT
ERG

Section 7 - Handling and Storage

Handling Precautions: Avoid generating and breathing dust. Avoid contact with skin and eyes.

Wear protective clothing when risk of exposure occurs.

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.

Handle and open container with care.

Keep dry. Reacts violently with water.

WARNING: Contact with water generates heat.

Avoid contact with incompatible materials.
 Avoid physical damage to containers.
 Keep containers securely sealed when not in use.
 Always wash hands with soap and water after handling. Work clothes should be laundered separately. Launder contaminated clothing before reuse. Use good occupational work practice. 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: Plastic bag or Packaging as recommended by manufacturer. Glass container. Polyethylene or polypropylene container or Polylined drum.
 DO NOT use aluminum, galvanized or tin-plated containers.
 Check that containers are clearly labeled.

Storage Requirements: Keep dry. Reacts violently with water.
 Store in original containers. Keep containers securely sealed. Store in a cool, dry, well-ventilated area. Store away from incompatible materials and foodstuff containers. Protect containers against physical damage and check regularly for leaks.
 Observe manufacturer's storing and handling recommendations.
 DO NOT use aluminum, galvanized or tin-plated containers.

Regulatory Requirements: Follow applicable OSHA regulations.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: Use in a well-ventilated area DO NOT handle directly. Wear gloves and use scoop/tongs/tools. If risk of overexposure exists, wear NIOSH approved respirator.
 If conditions are such that worker exposure potential is high, wear full-face air-supplied breathing apparatus and full protective suit.

Personal Protective Clothing/Equipment:

Eyes: Safety glasses with side shields Chemical goggles. Full face shield.
 Contact lenses pose a special hazard; soft lenses may absorb irritants and all lenses concentrate them.

Hands/Feet: DO NOT handle directly. Wear gloves and use scoop/tongs/tools.
 Elbow length PVC gloves or Butyl rubber gloves or Neoprene rubber gloves.
 Safety footwear.

Respiratory Protection:

Exposure Range >2 to <10 mg/m³: Air Purifying, Negative Pressure, Half Mask
 Exposure Range 10 to unlimited mg/m³: Self-contained Breathing Apparatus, Pressure Demand, Full Face
 Cartridge Color: dust/mist filter (use P100 or consult supervisor for appropriate dust/mist filter)

Other: Overalls. PVC apron. PVC protective suit may be required if exposure severe.
 Eyewash unit. Ensure there is ready access to a safety shower.

Section 9 - Physical and Chemical Properties

Appearance/General Info: White hygroscopic, odorless, pellets, flakes, sticks or solid cast mass. Explosive boiling and spitting will occur if added to hot water. Reacts violently with acids. CAUSTIC alkali. Soluble in alcohol, ether, glycerol.

Physical State: Divided solid
Vapor Pressure (kPa): Negligible

Formula Weight: 40

Specific Gravity (H₂O=1, at 4 °C): 2.12 at 20 °C

pH: Not applicable

pH (1% Solution): 12.7

Boiling Point: 1390 °C (2534 °F)

Freezing/Melting Point: 318.4 °C (605.12 °F)

Water Solubility: 1 g dissolves in 0.9 ml water

Section 10 - Stability and Reactivity

Stability/Polymerization/Conditions to Avoid: Vigorously exotherms when mixed with water. In the presence of moisture, highly corrosive to aluminum, zinc and tin.

HIGHLY reactive: with ammonium salts evolves ammonia gas. Rapidly picks up moisture from the air and with carbon dioxide in air forms sodium carbonate.

Presence of incompatible materials and storage in unsealed containers.

Product is considered stable under normal handling conditions.

Hazardous polymerization will not occur.

Storage Incompatibilities: Keep dry. Reacts violently with water.

Segregate from water, strong oxidizers, strong acids, organic materials, ammonium compounds, nitro compounds and trichlorethylene.

Section 11 - Toxicological Information

Toxicity

No data reported

Irritation

Skin (rabbit): 500 mg/24h SEVERE

Eye (rabbit): 0.05 mg/24h SEVERE

Eye(rabbit):1 mg/24h SEVERE

Eye(rabbit):1 mg/30s rinsed-SEVERE

See RTECS WB 4900000, for additional data.

Section 12 - Ecological Information

Environmental Fate: No data found.

Ecotoxicity: LC₁₀₀ Cyprinus carpio 180 ppm/24 hr at 25 deg; TL_m mosquito fish 125 ppm/96 hr (freshwater) ; TL_m Bluegill 99 mg/L/48 hr (tap water)

Biochemical Oxygen Demand (BOD): none

Octanol/Water Partition Coefficient: log K_{ow} = too low to be measured

Section 13 - Disposal Considerations

Disposal: Recycle wherever possible or consult manufacturer for recycling options.

Follow applicable federal, state, and local regulations.

Treat and neutralize with dilute acid at an effluent treatment plant.

Recycle containers, otherwise dispose of in an authorized landfill.

Section 14 - Transport Information

DOT Hazardous Materials Table Data (49 CFR 172.101):

Shipping Name and Description: Sodium hydroxide, solid

ID: UN1823

Hazard Class: 8 - Corrosive material

Packing Group: II - Medium Danger

Symbols:

Label Codes: 8 - Corrosive

Special Provisions: IB8, IP2, IP4

Packaging: Exceptions: 154 **Non-bulk:** 212 **Bulk:** 240

Quantity Limitations: Passenger aircraft/rail: 15 kg **Cargo aircraft only:** 50 kg

Vessel Stowage: **Location:** A **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: 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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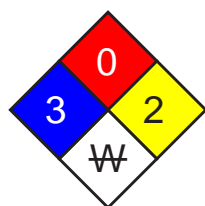
Material Name: Sulfuric Acid **CAS Number:** 7664-93-9
Chemical Formula: H₂O₄S
Structural Chemical Formula: H₂SO₄
EINECS Number: 231-639-5
ACX Number: X1002217-4
Synonyms: ACIDE SULFURIQUE; ACIDO SOLFORICO; ACIDO SULFURICO; BATTERY ACID; BOV; DIHYDROGEN SULFATE; DIPPING ACID; ELECTROLYTE ACID; EPA PESTICIDE CHEMICAL CODE 078001; HYDROGEN SULFATE; MATTLING ACID; OIL OF VITRIOL; SCHWEFELSAEURELOESUNGEN; SULFURIC ACID; SULFURIC ACID (AQUEOUS); SULFURIC ACID, SPENT; SULPHURIC ACID; VITRIOL BROWN OIL; ZWAVELZUUROPLOSSINGEN
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

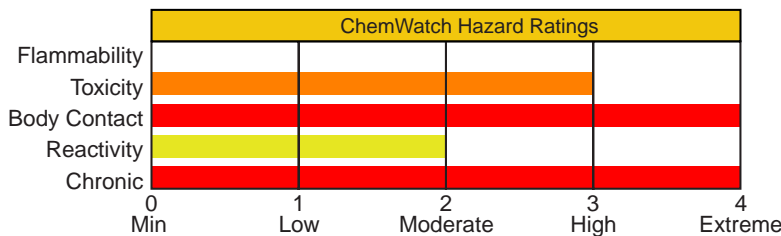
Name	CAS	%
sulfuric acid	7664-93-9	>51
water	7732-18-5	remainder

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



HMIS	
3	Health
0	Flammability
2	Reactivity

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.

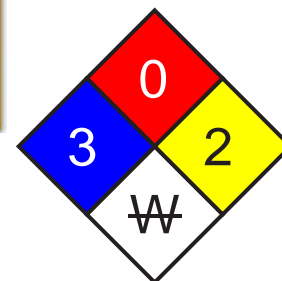
Do not approach containers suspected to be hot.

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.

See
DOT
ERG



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).

See
DOT
ERG

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.



Material Safety Data Sheet

The information presented in these forms is believed to be correct and sufficient to meet the requirements of OSHA Hazard Communication standard (29 CFR 1910.1200) concerning worker's right to know.

The following material safety data sheet covers the hazardous ingredients associated with more than one color aerosol product. As per 29 CFR 1900. 1200 paragraph (g); whenever the hazards associated with similar mixtures are the same, then one MSDS may be prepared to cover several products. This MSDS covers the following Aerove aerosol products.

PRODUCT NAME: Survey Marking Paint

Non-Fluorescent Colors		Fluorescent Colors	16 oz. I.A.C.		High Delivery	Metallic
201 Red	207 White	220 Red	261S Red	270S Fluorescent Red	281 Red	210 Silver
202 Yellow	208 Hi Visibility Yellow	222 Orange	262S Yellow	272S Fluorescent Orange	282 Yellow	
203 Blue	209 Light Blue	224 Green	263S Blue	274S Fluorescent Green	288 Fluorescent Orange	
204 Green	212 Purple	226 Yellow	265S Orange	275S Fluorescent Red/Orange		
205 Orange		227 Blue	267S White	279S Fluorescent Pink		
206 Black		229 Pink				
		230 Red/Orange				

SECTION I - MANUFACTURER IDENTIFICATION

MANUFACTURER'S NAME: Aerove Industries, Inc.

INFORMATION PHONE: 775-782-0100

DATE REVISED: November 8, 2006

ADDRESS: 1198 Mark Circle, Gardnerville, NV 89410

EMERGENCY PHONE: 1-800-424-9300

REASON REVISED: Updated

SECTION II - HAZARDOUS INGREDIENTS / SARA III INFORMATION OCCUPATIONAL EXPOSURE LIMITS

HAZARDOUS COMPONENTS	WEIGHT PERCENT	OSHA PEL	ACGIH TLV	LD50 SPECIES & ROUTE	LC50 SPECIES & ROUTE
Hydrocarbon Propellant (CAS 68476-86-8)	10 - 30	1000 ppm	1000 ppm	N / AV	N / AV
Aliphatic Petroleum Distillates (CAS 64742-89-8)	10 - 30	N / AV	300 ppm	N / AV	N / AV
*Hexane (CAS 110-54-3)	7 - 13	500 ppm	50 ppm (skin)	2870 mg / kg (Rat-Oral)	N / AV
Aliphatic Petroleum Distillates (CAS 64742-89-8)	10 - 30	N / AV	300 ppm	N / AV	N / AV
Aliphatic Petroleum Distillates (CAS 64742-88-7)	1 - 5	100 ppm	100 ppm	N / AV	N / AV
Non-Fluorescent Colors Also Contain: Acetone (CAS 67-64-1)	5 - 10	1000 ppm	500 ppm	5800 mg / kg (Rat-Oral)	21000 ppm / 8 hr (Rat-Inha)
Metallic Colors Also Contain: Acetone (CAS 67-64-1)	30 - 60	1000 ppm	500 ppm	5800 mg / kg (Rat-Oral)	21000 ppm / 8 hr (Rat-Inha)
n-Butyl Acetate (CAS 123-86-4)	1 - 5	150 ppm	150 ppm	200 ppm	N / AV
Aliphatic Hydrocarbon (CAS 64742-47-8)	1 - 5	N / AV	N / AV	1200 mg / m ³	N / AV

*Indicates toxic chemical(s) subject to the reporting requirements of section 313 of Title III and of 40 CFR 372.

NOTE: N / AP = Not Applicable N / AV = Not Available

Survey Marking Paint November 8, 2006

SECTION III - PHYSICAL / CHEMICAL CHARACTERISTICS

BOILING POINT: N / AP

VAPOR DENSITY: Heavier than air

EVAPORATION RATE: Faster than n-Butyl Acetate

SPECIFIC GRAVITY (H20=1): 0.9

SOLUBILITY IN WATER: Partial

APPEARANCE AND ODOR: Opaque liquid with hydrocarbon odor.

SECTION IV - FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: < 0° F (-18° C)

EXTINGUISHING MEDIA: Carbon dioxide, dry chemical, water spray.

SPECIAL FIRE FIGHTING PROCEDURES: Use water spray to cool containers exposed to heat or fire to prevent pressure build up.

Self-contained breathing apparatus should be used if product is involved in fire.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Treat as cylinders of compressed gas. Closed containers may rupture due to pressure build up from extreme temperature.

FLAMMABILITY: Yes - Flammable aerosol under conditions of sparks, flame, or hot surfaces.

SENSITIVITY TO IMPACT: Do not puncture

METHOD USED: Estimated

FLAMMABLE LIMITS - LEL: 0.9% **UEL:** 13.0%

SECTION V - REACTIVITY DATA

STABILITY: Stable

INCOMPATIBILITY (MATERIALS TO AVOID): Strong oxidizing agents.

HAZARDOUS DECOMPOSITION OR BY-PRODUCTS: Carbon Monoxide, Carbon Dioxide.

HAZARDOUS POLYMERIZATION: Will not occur

CONDITIONS TO AVOID: Open flames, sparks, electrical arcs.

SECTION VI - HEALTH HAZARD DATA

INHALATION: Respiratory tract irritant. May cause dizziness, light-headedness and / or headaches. Intentional misuse by deliberately concentrating and inhaling the contents may be harmful or fatal.

SKIN CONTACT: Prolonged or repeated contact may cause irritation and dermatitis.

EYE CONTACT: Painful with slight to moderate irritation.

INGESTION: May be harmful or fatal if swallowed

EFFECTS OF CHRONIC OVEREXPOSURE: Reports have associated repeated and prolonged overexposure to solvents with permanent brain and nervous system damage. Repeated overexposure can also damage kidneys, lungs, liver, heart and blood.

CARCINOGENICITY: The ingredients are not listed as a human carcinogen by IARC, ACGIH, NTP, or OSHA.

TERATOGENICITY: Not established

MUTAGENICITY: Not established

MEDICAL CONDITION GENERALLY AGGRAVATED BY EXPOSURE: Not established

EMERGENCY AND FIRST AID PROCEDURES: INHALATION - Remove from exposure, seek medical attention if signs/symptoms persist.

SKIN - Wash affected area with soap and water, remove contaminated clothing, seek medical attention if irritation persists.

EYES - Flush immediately with water for 15 minutes, seek medical attention if irritation persists.

INGESTION - Do not induce vomiting. Contact physician or poison control center immediately.

SECTION VII - PRECAUTIONS FOR SAFE HANDLING AND USE

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED: Remove all sources of ignition. Ventilate area. Prevent from entering a watercourse. Use an inert absorbent material and non-sparking type tools.

WASTE DISPOSAL METHOD: Dispose of in accordance with local, state and federal regulations. Do not incinerate closed containers.

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING: Do not store above 120° F (49° C). Do not store or use near heat, sparks or flame.

OTHER PRECAUTIONS: Avoid contact with eyes and skin. Do not breathe vapors, take internally or smoke while using this product.

SECTION VIII - CONTROL MEASURES

RESPIRATORY PROTECTION: In areas with poor ventilation, use a NIOSH approved Organic Vapor Cartridge Respirator.

For concentrations above the TLV (as defined in Section II), use a positive air supplied respirator.

VENTILATION: General ventilation to maintain exposure limits below TLV's as defined in Section II.

PROTECTIVE GLOVES: Chemical resistant gloves such as Neoprene or Nitrile rubber.

EYE PROTECTION: Safety glasses or goggles.

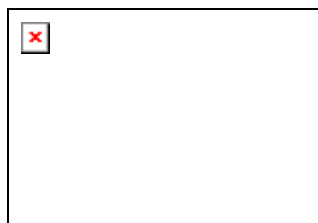
OTHER PROTECTIVE CLOTHING OR EQUIPMENT: Not established.

WORK / HYGIENIC PRACTICES: Avoid prolonged or repeated contact. Do not breathe vapors. Wash contaminated clothing prior to reuse.

SECTION IX - DISCLAIMER

THE INFORMATION CONTAINED HEREIN IS BELIEVED TO BE ACCURATE BUT IS NOT WARRANTED TO BE SO. NOTHING CONTAINED HEREIN CONSTITUTES A SPECIFICATION NOR IS IT INTENDED TO WARRANT SUITABILITY FOR THE INTENDED USE.

MATERIAL SAFETY DATA SHEET



Date-Issued: 08/04/2000
MSDS Ref. No: 211110
Date-Revised: 02/21/2001
Revision No: 3

Toluene

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Toluene
PRODUCT DESCRIPTION: Toluene
PRODUCT CODE: 211110
PRODUCT FORMULATION NAME: Toluene
CHEMICAL FAMILY: Aromatic Hydrocarbon
GENERIC NAME: Methylbenzene, Toluol

MANUFACTURER

Americhem Sales Corporation
340 North Street
Mason, MI 48854
Contact: Americhem Sales Corporation
Product Stewardship: 517-676-9363
Transportation: 517-676-9363

24 HR. EMERGENCY TELEPHONE NUMBERS

CHEMTREC (U.S.): (800) 424-9300
Canutec (613) 996-6666
Emergency Phone: 800-424-9300

2. COMPOSITION / INFORMATION ON INGREDIENTS

<u>Chemical Name</u>	<u>Wt.%</u>	<u>CAS# EINECS#</u>
Benzene, methyl-	>99	108-88-3 203-625-9

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

PHYSICAL APPEARANCE: Clear, Colorless liquid.

IMMEDIATE CONCERNS: CAUTION! May cause eye and skin irritation.

POTENTIAL HEALTH EFFECTS

EYES: May cause moderate burning, tearing, redness and swelling.

SKIN: Moderate irritation and discomfort. Defatting of skin and redness are possible. Toxic systemic effects from absorption are expected to be minor.

INGESTION: Gastrointestinal tract irritation and/or discomfort is possible.

INHALATION: Dizziness, impaired coordination, headaches and loss of consciousness. Severe respiratory tract irritation. Toxic systemic effects are possible.

MEDICAL CONDITIONS AGGRAVATED: Disorders or diseases of the skin, eye, liver, kidney, nervous system, respiratory and/or pulmonary system, lung (e.g. Asthma like conditions).

ROUTES OF ENTRY: Absorption, Inhalation, Ingestion

4. FIRST AID MEASURES

EYES: Immediately flush eyes with plenty of water for 15 minutes. If irritation persists, seek medical attention.

SKIN: Wash exposed area with mild soap and water. Get medical attention if irritation develops or persists.

INGESTION: Do not Induce Vomiting. Get immediate medical attention.

INHALATION: Remove victim from area of exposure. If unconscious, give oxygen. Give artificial respiration if not breathing. Get immediate medical attention.

5. FIRE FIGHTING MEASURES

FLASHPOINT AND METHOD: (45°F)TAG CC

FLAMMABLE LIMITS: 1.0 to 7.0

AUTOIGNITION TEMPERATURE: (997°F)

FLAMMABLE CLASS: Treat as an OSHA Class IB Flammable liquid

EXTINGUISHING MEDIA: Use dry chemical, foam, or carbon dioxide.

EXPLOSION HAZARDS: Vapor accumulations may flash and/or explode if ignited. Keep ignition sources, open flames, ect., away from these fumes.

FIRE FIGHTING PROCEDURES: Proper respiratory equipment to protect against the hazardous effects of combustion products is recommended. Water in a straight hose stream may cause fire to spread and should be used as a cooling medium only.

6. ACCIDENTAL RELEASE MEASURES

SMALL SPILL:

Extinguish possible sources of ignition. Evacuate all unprotected personnel and ventilate area. Only personnel equipped with proper respiratory, skin/eye protection should enter spill area. Dike area to contain spill and clean up by absorbing on an inert absorbant or other means. Don't flush into sewers or natural waterways.

LARGE SPILL:

Contain material as described above and call the local fire or police department for immediate emergency assistance.

7. HANDLING AND STORAGE

HANDLING:

Open container slowly to relieve any pressure. Bond and ground all equipment when transferring from one vessel or container to another. This material can accumulate static charge by flow or agitation. Vapors can be ignited by static discharge. Use explosion proof equipment as directed by local fire codes.

STORAGE:

Store unopened containers under cool, dry and ventilated conditions. Keep away from heat, sparks and flame.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE GUIDELINES:

OSHA HAZARDOUS COMPONENTS (29 CFR 1910.1200)

EXPOSURE LIMITS

<u>OSHA PEL</u>	<u>ACGIH TLV</u>	<u>Supplier OEI</u>			
<u>ppm</u>	<u>mg/m³</u>	<u>ppm</u>	<u>mg/m³</u>	<u>ppm</u>	<u>mg/m³</u>

Benzene, methyl-	TWA 100 375	S 50 ^{U1} 188	NL	NL
	STEL 150 560	NL NL	NL	NL

OSHA TABLE COMMENTS:

1. S = Skin

ENGINEERING CONTROLS: If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure guidelines, additional ventilation or exhaust systems may be required. Where explosive mixtures may be present, electrical systems safe for such locations must be used.

PERSONAL PROTECTIVE EQUIPMENT

EYES AND FACE: Wear safety glasses with side shields or goggles when handling this material.

SKIN: To prevent any contact, wear impervious protective clothing such as neoprene or butyl rubber gloves, apron, boots or whole bodysuit, as appropriate.

RESPIRATORY: Use NIOSH/MSHA approved respirators when vapors or mist concentrations exceed permissible exposure limits.

PROTECTIVE CLOTHING: Chemical resistant boots, apron, etc. as necessary to prevent contamination of clothing and skin contact.

WORK HYGIENIC PRACTICES: Good personal hygiene practices should always be followed.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: Liquid

ODOR: Sweet aromatic odor

APPEARANCE: Clear

COLOR: Colorless

pH: Not Applicable

PERCENT VOLATILE: 100

VAPOR PRESSURE: 26 mmHg at 20°C

VAPOR DENSITY: 3.2 (Air=1)

BOILING POINT: (231°F)

MELTING POINT: (-139°F)

SOLUBILITY IN WATER: Negligible

EVAPORATION RATE: 1.9 (n-Butyl Acetate=1)

SPECIFIC GRAVITY: 0.87 (water=1) at (60°F)

MOLECULAR FORMULA: C₇H₈

10. STABILITY AND REACTIVITY

STABLE: YES

HAZARDOUS POLYMERIZATION: NO

CONDITIONS TO AVOID: Exposure to excessive heat, open flames and sparks. Avoid conditions that favor the formation of excessive mists and/or fumes.

STABILITY: Stable

POLYMERIZATION: Will not occur

HAZARDOUS DECOMPOSITION PRODUCTS: Oxides of Carbon when burned.

INCOMPATIBLE MATERIALS: Strong oxidizing agents.

11. TOXICOLOGICAL INFORMATION

TARGET ORGANS: Toluene (CAS No. 108-88-3) - Intentional misuse by deliberate inhalation of high conc. of toluene has been shown to cause liver, kidney and CNS damage, including hearing loss and visual disturbances. Subchronic and chronic inhalation studies with toluene produced kidney and liver damage, hearing loss and CNS damage in laboratory animals.

REPRODUCTIVE EFFECTS: Toluene (CAS No. 108-88-3) - Exposure to toluene during pregnancy has demonstrated limited evidence of developmental toxicity in laboratory animals. The effects seen include decreased fetal body weight and increased skeletal variations in both inhalation and oral studies.

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION: Aquatic Toxicity -
Freshwater toxic concentrations: 61ppm-1hour sunfish, 44ppm-96hours TLM fathead
minnow, 24ppm- 96hours TLM bluegill.
Saltwater Toxicity -
33ppm-24hours TLM Brine shrimp

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHOD: Conditions of use may cause this material to become a hazardous waste as defined by state or federal law. Use approved treatment, transporters and disposal sites.

14. TRANSPORT INFORMATION

DOT (DEPARTMENT OF TRANSPORTATION)

PROPER SHIPPING NAME: Toluene

PRIMARY HAZARD CLASS/DIVISION: 3

UN/NA NUMBER: UN1294

PACKING GROUP: II

LABEL: Flammable Liquid

15. REGULATORY INFORMATION

UNITED STATES

SARA TITLE III (SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT)

311/312 HAZARD CATEGORIES:

**FIRE: YES PRESSURE GENERATING: NO REACTIVITY: NO ACUTE: YES
CHRONIC: YES**

313 REPORTABLE INGREDIENTS: Toluene (CAS No. 108-88-3) - 100%

CERCLA (COMPREHENSIVE RESPONSE, COMPENSATION, AND LIABILITY ACT)

CERCLA REGULATORY: Toluene (CAS No. 108-88-3) - 100%

TSCA (TOXIC SUBSTANCE CONTROL ACT)

TSCA REGULATORY: This material or its components are listed in the TSCA inventory.

PROPOSITION 65 STATEMENT: This material contains the following chemicals which are known to the State of California to cause cancer, birth defects or other reproductive harm, and are subject to the requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5):

ComponentEffect
BenzeneCancer
TolueneDevelopmental Toxicant

16. OTHER INFORMATION

REVISION SUMMARY

Revision #: 3

This MSDS replaces the February 21, 2001 MSDS. Any changes in information are as follows:
In Section 16
Additional MSDS Information (text)

NFPA CODES

HEALTH: 2 FIRE: 3 REACTIVITY: 0

HMIS CODES

HEALTH: *2 FIRE: 3 REACTIVITY: 0 PROTECTION: G

MANUFACTURER DISCLAIMER: The information in this MSDS was obtained from sources which we believe are reliable. However, the above information is provided without warranty, expressed or implied, regarding its correctness. The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of the product.

Section 1 - Chemical Product and Company Identification

61

Material Name: Trisodium Phosphate

CAS Number: 7601-54-9

Chemical Formula: Na₃O₄P

Structural Chemical Formula: Na₃PO₄

EINECS Number: 231-509-8

ACX Number: X1009304-0

Synonyms: ANTISAL 4; DRI-TRI; EMULSIPHOS 440/660; NUTRIFOS STP; OAKITE; PHOSPHORIC ACID,TRISODIUM SALT; SODIUM ORTHOPHOSPHATE,TERTIARY; SODIUM PHOSPHATE; SODIUM PHOSPHATE,ANHYDROUS; SODIUM PHOSPHATE,TRIBASIC; SODIUM TERTIARY PHOSPHATE; TERTIARY SODIUM PHOSPHATE; TRIBASIC SODIUM ORTHOPHOSPHATE; TRIBASIC SODIUM PHOSPHATE; TRINATRIUMPHOSPHAT; TRISODIUM ORTHOPHOSPHATE; TRISODIUM PHOSPHATE; TROMETE; TSP

General Use: Used in photographic developers; clarifying sugar; removing boiler scale, softening water; manufacturing paper, laundering; tanning leather; in detergent mixtures.

Section 2 - Composition / Information on Ingredients

Name	CAS	%
trisodium phosphate	7601-54-9	>98

OSHA PEL

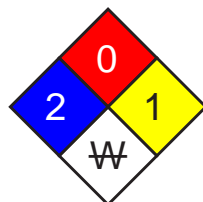
NIOSH REL

AIHA WEEL

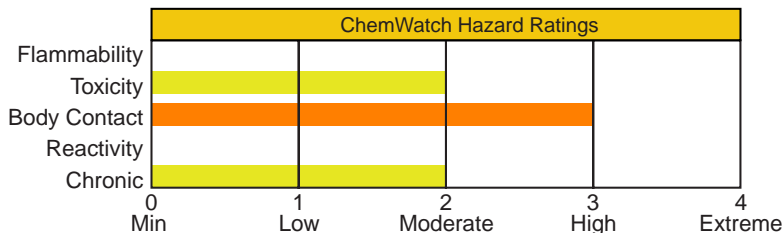
STEL: 5 mg/m³, 15-min.

ACGIH TLV

Section 3 - Hazards Identification



Fire Diamond



HMIS	
1	Health
0	Flammability
2	Reactivity

ANSI Signal Word

Warning!

☆☆☆☆☆ **Emergency Overview** ☆☆☆☆☆

Odorless, colorless to white crystalline solid. Severely irritating to eyes/skin/respiratory tract. Reacts with water.

Potential Health Effects

Target Organs: skin, digestive system

Primary Entry Routes: inhalation, ingestion

Acute Effects

Inhalation: The dust may be discomforting to the upper respiratory tract. Persons with impaired respiratory function, airway diseases, and conditions such as emphysema or chronic bronchitis may incur further disability if excessive concentrations of particulate are inhaled.

Eye: The material is extremely discomforting to the eyes 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 severe irritation to the eye causing pronounced inflammation. Repeated or prolonged exposure to irritants may produce conjunctivitis.

Skin: The material is extremely discomforting to the skin and is capable of causing skin reactions which may lead to dermatitis. Prolonged exposure may cause chemical burns. Solution of material in moisture on the skin or in perspiration may markedly increase skin corrosion and accelerate tissue destruction. 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: Considered to be nontoxic. Swallowing may cause intestinal discomfort, diarrhea, circulatory problems, digestive disturbances, severe stomach pain and burns. Phosphates are slowly and incompletely absorbed from the gastrointestinal tract and are unlikely (other than in abuse) to produce the systemic effects which occur when introduced by other routes. Such effects include vomiting, lethargy, fever, diarrhea, falls in blood pressure, slow pulse, cyanosis, carpal spasm, coma and tetany. These effects result following sequestration of blood calcium. Considered an unlikely route of entry in commercial/industrial environments.

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

Chronic Effects: Dogs given daily doses of sodium phosphate dibasic for 9-22 weeks showed calcium deposits in the kidneys (nephrocalcinosis) with disseminated atrophy of the proximal tubule. Animals fed on sodium phosphate dibasic and potassium dihydrogen phosphate, in both short- and long-term studies, showed increased bone porosity; hyperparathyroidism and soft tissue calcification were also evident.

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 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. 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 highly alkaline materials:

1. Respiratory stress is uncommon but presents occasionally because of soft tissue edema.
2. Unless endotracheal intubation can be accomplished under direct vision, cricothyroidotomy or tracheotomy may be necessary.
3. Oxygen is given as indicated.
4. The presence of shock suggests perforation and mandates an intravenous line and fluid administration.
5. Alkali corrosives cause damage by liquefaction necrosis whereby the saponification of fats and solubilization of proteins allow deep penetration into the tissue.

Alkalis continue to cause damage after exposure.

INGESTION:

1. Milk and water are the preferred dilutents. No more than 2 glasses of water should be given to an adult.
2. Neutralizing agents should never be given since exothermic heat reaction may compound injury.

* Catharsis and emesis are absolutely contra-indicated.

* Activated charcoal does not absorb alkali.

* Gastric lavage should not be used.

Supportive care involves the following.

1. Withhold oral feedings initially.
2. If endoscopy confirms transmucosal injury start steroids only within the first 48 hours.
3. Carefully evaluate the amount of tissue necrosis before assessing the need for surgical intervention.
4. Patients should be instructed to seek medical attention whenever they develop difficulty in swallowing (dysphagia).

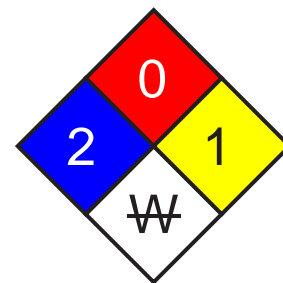
SKIN AND EYE:

1. Injury should be irrigated for 20-30 minutes.

Eye injuries require saline.

Section 5 - Fire-Fighting Measures

Flash Point: Nonflammable
Autoignition Temperature: Not applicable
LEL: Not applicable
UEL: Not applicable
Extinguishing Media: There is no restriction on the type of extinguisher which may be used.
General Fire Hazards/Hazardous Combustion Products: Noncombustible. Not considered to be a significant fire risk.
 Will not burn, but heat produces highly toxic fumes/vapors.
 Reacts vigorously with acids.
 In presence of moisture, the material is corrosive to aluminum, zinc and tin producing highly flammable hydrogen gas.
 Decomposes on heating and produces toxic fumes of phosphorus oxides (PO_x).
Fire Incompatibility: Avoid reaction with acids.
 Avoid contact with aluminum and magnesium.
Fire-Fighting Instructions: Contact fire department and tell them location and nature of hazard.
 Wear full body protective clothing with breathing apparatus. Prevent spillage from entering drains or waterways.
 Use fire fighting procedures suitable for surrounding area.
 Do not approach containers suspected to be hot.
 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. Sweep up.
 Avoid contact with skin and eyes.
 If product enters drains, waterways or water courses, flush at least ten (10) times the volume of water to the drain.
 Place spilled material in clean, dry, sealable, labeled container.
Large Spills: Clear area of personnel and move upwind.
 Contact fire department and tell them location and nature of hazard.
 Control personal contact by using protective equipment and dust respirator.
 Prevent spillage from entering drains, sewers or waterways.
 Avoid generating dust. Sweep, shovel up. Recover product wherever possible.
 Put residues in labeled plastic bags or other containers for disposal.
 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: Limit all unnecessary personal contact.
 Wear protective clothing when risk of exposure occurs.
 Use in a well-ventilated area.
 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.
 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: Check that containers are clearly labeled.
 Multi-ply woven plastic or paper bag with sealed plastic liner.
 Polyethylene or polypropylene container.
 Steel drum.
 DO NOT use aluminum or galvanized containers.
Regulatory Requirements: Follow applicable OSHA regulations.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: General exhaust is adequate under normal operating conditions.
 If risk of overexposure exists, wear NIOSH-approved dust respirator.
 Correct fit is essential to obtain adequate protection.
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: Rubber gloves; Nitrile gloves. PVC gloves.

Safety footwear. Rubber boots.

Respiratory Protection:

Exposure Range >5 to 50 mg/m³: Air Purifying, Negative Pressure, Half Mask

Exposure Range >50 to 500 mg/m³: Air Purifying, Negative Pressure, Full Face

Exposure Range >500 to 5000 mg/m³: Supplied Air, Constant Flow/Pressure Demand, Full Face

Exposure Range >5000 to unlimited mg/m³: Self-contained Breathing Apparatus, Pressure Demand, Full Face

Cartridge Color: dust/mist filter (use P100 or consult supervisor for appropriate dust/mist filter)

Other: Overalls. Rubber apron.

Eyewash unit.

Ensure there is ready access to a safety shower.

Section 9 - Physical and Chemical Properties

Appearance/General Info: White crystalline powder, flake, granules or beads with no odor.

Physical State: Divided solid

pH (1% Solution): 12 approx.

Vapor Pressure (kPa): Not applicable

Boiling Point: 160 °C (320 °F)

Vapor Density (Air=1): Not applicable

Freezing/Melting Point: 75 °C (167 °F)

Formula Weight: 163.94

Volatile Component (% Vol): Negligible

Evaporation Rate: Not applicable

Water Solubility: 8.8 g soluble in 100 cc water

Section 10 - Stability and Reactivity

Stability/Polymerization/Conditions to Avoid: Presence of elevated temperatures. Prolonged exposure to heat.

Stable under normal storage conditions. Hazardous polymerization will not occur.

Storage Incompatibilities: Store away from extreme humidity.

Avoid strong acids.

Contact with certain food products (containing reducing sugars) may result in the formation of toxic carbon monoxide gas.

Section 11 - Toxicological Information

Toxicity

Data for trisodium phosphate dodecahydrate only.

Oral (rat) LD₅₀: 7400 mg/kg

Oral (rat) LD₅₀: 6500 mg/kg

Dermal (rabbit) LD₅₀: 7940 mg/kg

Irritation

Eye (rabbit): (FSHA) Corrosive

Skin (rabbit): (FSHA) 3.3 on a scale of 8.0 - moderate

See RTECS YL 5620000, for additional data.

Section 12 - Ecological Information

Environmental Fate: No data found.

Ecotoxicity: Aquatic toxicity: 151 ppm/96 hr/mosquito fish/TL_m/Turbid water; 126 ppm/96 hr/daphnia magna/TL_m

Section 13 - Disposal Considerations

Disposal: Recycle wherever possible or consult manufacturer for recycling options.

Follow applicable federal, state, and local regulations.

Treat and neutralize with dilute acid at an effluent treatment plant.

Recycle containers, otherwise dispose of in an authorized landfill.

Section 14 - Transport Information

DOT Hazardous Materials Table Data (49 CFR 172.101):

Shipping Name and Description: None

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: Not listed

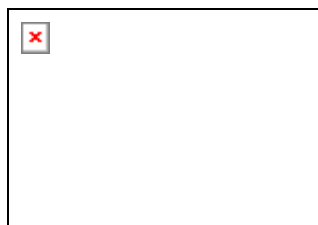
SARA EHS 40 CFR 355: Not listed

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.

MATERIAL SAFETY DATA SHEET



Date-Issued: 08/08/2000
MSDS Ref. No: 211120
Date-Revised: 02/26/2001
Revision No: 2

Xylene

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Xylene
PRODUCT DESCRIPTION: Xylene
PRODUCT CODE: 211120
PRODUCT FORMULATION NAME: Xylene
CHEMICAL FAMILY: Aromatic Hydrocarbon Solvent
GENERIC NAME: Xylol, Dimethyl Benzene

MANUFACTURER

Americhem Sales Corporation
340 North Street
Mason, MI 48854
Contact: Americhem Sales Corporation
Product Stewardship: 517-676-9363
Transportation: 517-676-9363

24 HR. EMERGENCY TELEPHONE NUMBERS

CHEMTREC (U.S.): (800) 424-9300
Canutec (613) 996-6666
Emergency Phone: 800-424-9300

2. COMPOSITION / INFORMATION ON INGREDIENTS

<u>Chemical Name</u>	<u>Wt. %</u>	<u>CAS#</u>	<u>EINECS#</u>
Xylenes (o-,m-,p- isomers)	75 - 90	1330-20-7	
Ethyl Benzene	10 - 25	100-41-4	

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

PHYSICAL APPEARANCE: Clear, Colorless liquid.

IMMEDIATE CONCERNS: CAUTION! May cause eye and skin irritation.

POTENTIAL HEALTH EFFECTS

EYES: May cause moderate burning, tearing, redness and swelling.

SKIN: Moderate irritation and discomfort. Defatting of skin and redness are possible. Toxic systemic effects from absorption are expected to be minor.

INGESTION: Gastrointestinal tract irritation and/or discomfort is possible.

INHALATION: Dizziness, impaired coordination, headaches and loss of consciousness. Severe respiratory tract irritation. Toxic systemic effects are possible.

MEDICAL CONDITIONS AGGRAVATED: Disorders of the skin, respiratory and central nervous system.

ROUTES OF ENTRY: Absorption, Inhalation

TARGET ORGAN STATEMENT: Reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage (sometimes referred to as Solvent or Painters' Syndrome). Intentional misuse by deliberately concentrating and inhaling this material may be harmful or fatal.

CANCER STATEMENT: This material and components above 0.1% are not listed as carcinogens by IARC, NTP or OSHA.

4. FIRST AID MEASURES

EYES: Immediately flush eyes with plenty of water for 15 minutes. If irritation persists, seek medical attention.

SKIN: Wash exposed area with mild soap and water. Get medical attention if irritation develops or persists.

INGESTION: Do not Induce Vomiting. Get immediate medical attention.

INHALATION: Remove victim from area of exposure. If unconscious, give oxygen. Give artificial respiration if not breathing. Get immediate medical attention.

NOTES TO PHYSICIAN: Exposure to high concentrations of this material (e.g., in enclosed spaces or with deliberate abuse) may be associated with cardiac arrhythmias. Epinephrine and other sympathomimetic drugs may initiate cardiac arrhythmias in persons exposed to this material. If sympathomimetic drugs are administered, observe for the development of cardiac arrhythmias.

5. FIRE FIGHTING MEASURES

FLASHPOINT AND METHOD: (81°F)ASTM D56

FLAMMABLE LIMITS: 1.0 to 7.0

AUTOIGNITION TEMPERATURE: (810°F) to (984°F)

EXTINGUISHING MEDIA: Use dry chemical, foam, or carbon dioxide.

EXPLOSION HAZARDS: Vapor accumulations may flash and/or explode if ignited. Keep ignition sources, open flames, ect., away from these fumes.

FIRE FIGHTING PROCEDURES: Proper respiratory equipment to protect against the hazardous effects of combustion products is recommended. Water in a straight hose stream may cause fire to spread and should be used as a cooling medium only.

6. ACCIDENTAL RELEASE MEASURES

SMALL SPILL:

Extinguish possible sources of ignition. Evacuate all unprotected personnel and ventilate area. Only personnel equipped with proper respiratory, skin/eye protection should enter spill area. Dike area to contain spill and clean up by absorbing on an inert absorbant or other means. Don't flush into sewers or natural waterways.

LARGE SPILL:

Contain material as described above and call the local fire or police department for immediate emergency assistance.

7. HANDLING AND STORAGE

HANDLING:

Open container slowly to relieve any pressure. Bond and ground all equipment when transferring from one vessel or container to another. This material can accumulate static charge by flow or agitation. Vapors can be ignited by static discharge. Use explosion proof equipment as directed by local fire codes.

STORAGE:

Store unopened containers under cool, dry and ventilated conditions. Keep away from heat, sparks and flame.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE GUIDELINES:

OSHA HAZARDOUS COMPONENTS (29 CFR 1910.1200)

	<u>EXPOSURE LIMITS</u>					
	<u>OSHA PEL</u>		<u>ACGIH TLV</u>		<u>Supplier OEL</u>	
	<u>ppm</u>	<u>mg/m³</u>	<u>ppm</u>	<u>mg/m³</u>	<u>ppm</u>	<u>mg/m³</u>
Xylenes (o-,m-,p- isomers)	TWA	100		100		
	STEL			150		
Ethyl Benzene	TWA			100		
	STEL			150		

ENGINEERING CONTROLS: If current ventilation practices are not adequate to maintain airborne concentrations below the established exposure guidelines, additional ventilation or exhaust systems may be required. Where explosive mixtures may be present, electrical systems safe for such locations must be used.

PERSONAL PROTECTIVE EQUIPMENT

EYES AND FACE: Wear safety glasses with side shields or goggles when handling this material.

SKIN: To prevent any contact, wear impervious protective clothing such as neoprene or butyl rubber gloves, apron, boots or whole bodysuit, as appropriate.

RESPIRATORY: Use NIOSH/MSHA approved respirators when vapors or mist concentrations exceed permissible exposure limits.

PROTECTIVE CLOTHING: Chemical resistant boots, apron, etc. as necessary to prevent contamination of clothing and skin contact.

9. PHYSICAL AND CHEMICAL PROPERTIES

PHYSICAL STATE: Liquid

ODOR: Light Aromatic

APPEARANCE: Clear

COLOR: Colorless

pH: Not Applicable

PERCENT VOLATILE: 100

VAPOR PRESSURE: 7 mmHg at 20°C

VAPOR DENSITY: 3.7 (Air=1)

BOILING POINT: (276°F) to (284°F)

FREEZING POINT: Not Determined

MELTING POINT: Not Determined

SOLUBILITY IN WATER: Negligible

EVAPORATION RATE: 0.6 (n-Butyl Acetate=1)

SPECIFIC GRAVITY: 0.87 (water=1) at (60°F)

MOLECULAR FORMULA: C₈H₁₀

MOLECULAR WEIGHT: 106

10. STABILITY AND REACTIVITY

STABLE: YES

HAZARDOUS POLYMERIZATION: NO

CONDITIONS TO AVOID: Exposure to excessive heat, open flames and sparks. Avoid conditions that favor the formation of excessive mists and/or fumes.

STABILITY: Stable

POLYMERIZATION: Will not occur

HAZARDOUS DECOMPOSITION PRODUCTS: Oxides of Carbon when burned.

INCOMPATIBLE MATERIALS: Strong oxidizing agents.

11. TOXICOLOGICAL INFORMATION

TARGET ORGANS: A six week inhalation study with xylene produced hearing loss in rats.

REPRODUCTIVE EFFECTS: Both mixed xylenes and the individual isomers produced limited evidence of fetal toxicity in laboratory animals. Inhalation and oral administration of xylene resulted in decreased fetal weight, increased incidences of delayed bone development, skeletal variations and missed abortions.

12. ECOLOGICAL INFORMATION

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHOD: Conditions of use may cause this material to become a hazardous waste as defined by state or federal law. Use approved treatment, transporters and disposal sites.

FOR LARGE SPILLS: Extinguish possible sources of ignition. Evacuate all unprotected personnel and ventilate area. Only personnel equipped with proper respiratory, skin/eye protection should enter spill area. Dike area to contain spill and clean up by absorbing on an inert absorbent or other means. Don't flush into sewers or natural waterways.

14. TRANSPORT INFORMATION

DOT (DEPARTMENT OF TRANSPORTATION)

PROPER SHIPPING NAME: Xylene

PRIMARY HAZARD CLASS/DIVISION: 3

UN/NA NUMBER: UN1307

PACKING GROUP: III

LABEL: Flammable Liquid

15. REGULATORY INFORMATION

UNITED STATES

SARA TITLE III (SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT)**311/312 HAZARD CATEGORIES:**

**FIRE: YES PRESSURE GENERATING: NO REACTIVITY: NO ACUTE: YES
CHRONIC: YES**

313 REPORTABLE INGREDIENTS: Xylene (CAS No. 1330-20-7) - 75 to 90%
Ethyl benzene (CAS No. 100-41-4) - 10 to 25%

CERCLA (COMPREHENSIVE RESPONSE, COMPENSATION, AND LIABILITY ACT)

CERCLA REGULATORY: Xylene (CAS No. 1330-20-7) - 75 to 90%
Ethyl benzene (CAS No. 100-41-4) - 10 to 25%

TSCA (TOXIC SUBSTANCE CONTROL ACT)

TSCA REGULATORY: This material or its components are listed in the TSCA inventory.

PROPOSITION 65 STATEMENT: This material contains the following chemicals which are known to the State of California to cause cancer, birth defects or other reproductive harm, and are subject to the requirements of California Proposition 65 (CA Health & Safety Code Section 25249.5):

ComponentEffect
BenzeneCancer
TolueneDevelopmental Toxicant

16. OTHER INFORMATION**REVISION SUMMARY**

Revision #: 2

This MSDS replaces the February 21, 2001 MSDS. Any changes in information are as follows:
In Section 14
DOT UN/NA Number

NFPA CODES

HEALTH: 2 FIRE: 3 REACTIVITY: 0

HMIS CODES

HEALTH: *2 FIRE: 3 REACTIVITY: 0 PROTECTION: X

MANUFACTURER DISCLAIMER: The information in this MSDS was obtained from sources which we believe are reliable. However, the above information is provided without warranty, expressed or implied, regarding its correctness. The conditions or methods of handling, storage, use and disposal of the product are beyond our control and may be beyond our knowledge. For this and other reasons, we do not assume responsibility and expressly disclaim liability for loss, damage or expense arising out of or in any way connected with the handling, storage, use or disposal of the product.

Section 1 - Chemical Product and Company Identification

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Material Name: Zinc Acetate **CAS Number:** 557-34-6
Chemical Formula: C₂H₃O₂Zn
Structural Chemical Formula: Zn(C₂H₃O₂)₂
EINECS Number: 209-170-2
ACX Number: X1013450-6
Synonyms: ACETIC ACID,ZINC SALT; ACETIC ACID,ZINC SALT (8CI,9CI); ACETIC ACID,ZINC(II) SALT; DICARBOMETHOXYZINC; ZINC ACETATE; ZINC DIACETATE
General Use: Preserving wood; as mordant in textile dyeing; manufacture of glazes for painting on porcelain; as a laboratory reagent in testing for albumin, tannin, urobilin, phosphate, blood; as an astringent.
 Also as a cross-linking agent for polymers; and fuel additive.

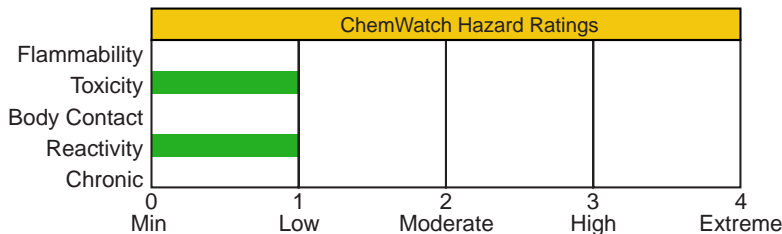
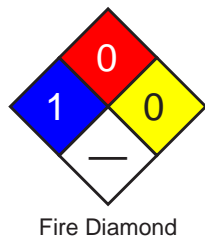
Section 2 - Composition / Information on Ingredients

Name	CAS	%
zinc acetate	557-34-6	98 min.

OSHA PEL **NIOSH REL**

ACGIH TLV

Section 3 - Hazards Identification



HMIS	
1	Health
0	Flammability
0	Reactivity

ANSI Signal Word
Caution

☆☆☆☆☆ **Emergency Overview** ☆☆☆☆☆

White crystals; faint acetous (vinegar) odor. Irritating to eyes/skin/respiratory tract. Also causes: upon ingestion: nausea, vomiting, headache, abdominal pain.

Potential Health Effects

Target Organs: eyes, skin, respiratory system, digestive system

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

Acute Effects

Inhalation: Not normally a hazard due to nonvolatile nature of product. The dust may be highly discomforting to the upper respiratory tract.

The heat decomposition products of zinc acetate cause irritation to mucous membranes, coughing. Severe and chronic exposure to zinc oxide fumes may result in "metal fume fever"; a disabling but transient disease.

Eye: The dust may be highly discomforting to the eyes 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.

Very dilute preparations of zinc acetate have been used as eye drops

Skin: The material is moderately discomforting to the skin if exposure is prolonged.

Open cuts, abraded or irritated skin should not be exposed to this material.

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

The material is highly discomforting to the gastrointestinal tract and may be harmful if swallowed.

Soluble zinc salts produces irritation and corrosion of the alimentary tract (in a manner similar to copper salts) with pain, vomiting, etc.

Delayed deaths have been ascribed to inanition (weakness and extreme weight loss resulting from prolonged and severe food insufficiency) following severe strictures of the esophagus, and pylorus.

Ingestion may cause irritation or burning of the digestive tract, nausea and vomiting, and watery or bloody diarrhea.

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

Chronic Effects: No human exposure data available. For this reason, health effects described are based on experience with chemically-related materials.

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 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: 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:

1. Absorption of zinc compounds occurs in the small intestine.
2. The metal is heavily protein bound.
3. Elimination results primarily from fecal excretion.
4. The usual measures for decontamination (Ipecac Syrup, lavage, charcoal or cathartics) may be administered, although patients usually have sufficient vomiting not to require them.
5. CaNa₂EDTA has been used successfully to normalise zinc levels and is the agent of choice.

Section 5 - Fire-Fighting Measures

Flash Point: Nonflammable

LEL: Not applicable

UEL: Not applicable

Extinguishing Media: There is no restriction on the type of extinguisher which may be used.

General Fire Hazards/Hazardous Combustion Products: Noncombustible. Slight explosion hazard when exposed to strong oxidizers.

Decomposes on heating and produces acrid smoke and toxic fumes of carbon monoxide (CO), carbon dioxide (CO₂) and zinc oxide.

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

An exothermic reaction may occur in contact with sulfuric oleum.

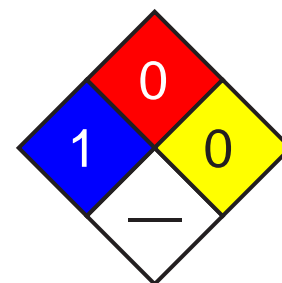
Fire-Fighting Instructions: Contact fire department and tell them location and nature of hazard.

Wear breathing apparatus plus protective gloves. Prevent spillage from entering drains or waterways.

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.



Fire Diamond

Section 6 - Accidental Release Measures

Small Spills: Clean up all spills immediately. Avoid contact with skin and eyes.

Wear impervious gloves and safety glasses.

Use dry clean-up procedures and avoid generating dust.

Vacuum up or sweep up.

Place spilled material in clean, dry, sealable, labeled container.

Large Spills: Clear area of personnel and move upwind.

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

Wear breathing apparatus plus protective gloves. Prevent spillage from entering drains or waterways.

Stop leak if safe to do so. Avoid generating dust.

Collect recoverable product into labeled containers for recycling.
 Collect residues and seal in labeled drums for disposal.
 Wash area down with large quantity of water 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.

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

Section 7 - Handling and Storage

Handling Precautions: Avoid generating and breathing dust.

Use good occupational work practices. Observe manufacturer's storing and handling recommendations.

Avoid all personal contact, including inhalation.

Wear protective clothing when risk of exposure occurs.

Use in a well-ventilated area.

Avoid contact with incompatible materials.

Avoid contact with moisture.

Handle and open container with care.

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.

Recommended Storage Methods: Multi-ply paper bag with sealed plastic liner or heavy gauge plastic bag. Check that all containers are clearly labeled and free from leaks. Packing as recommended by manufacturer.

Regulatory Requirements: Follow applicable OSHA regulations.

Section 8 - Exposure Controls / Personal Protection

Engineering Controls: None required when handling small quantities. OTHERWISE: Use in a well-ventilated area.

General exhaust is adequate under normal operating conditions.

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

Correct fit is essential to obtain adequate protection.

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: Barrier cream and PVC gloves.

Safety footwear.

Other: Overalls. Ensure there is ready access to a safety shower.

Eyewash unit.

Section 9 - Physical and Chemical Properties

Appearance/General Info: Available in both the anhydrous and more commonly the dihydrate form. Both forms are available as monoclinic crystals with an acetic acid odor. Both forms are very soluble in water and slightly soluble in alcohol.

Physical State: Divided solid

Vapor Pressure (kPa): Not applicable

Vapor Density (Air=1): Not applicable

Formula Weight: 183.5

Specific Gravity (H₂O=1, at 4 °C): 1.84

Evaporation Rate: Not applicable

pH: Not applicable

pH (1% Solution): 5 - 6

Boiling Point: Decomposes at 200 °C (392 °F)

Freezing/Melting Point: 237 °C (458.6 °F)

Volatile Component (% Vol): Not applicable

Decomposition Temperature (°C): 250-400

Water Solubility: 1 g soluble in 23 ml water

Section 10 - Stability and Reactivity

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

Storage Incompatibilities: Avoid storage with oxidizers.

Section 11 - Toxicological Information**Toxicity**Oral (rat) LD₅₀: 2510 mg/kgOral (rat) LD₅₀: 2170 mg/kg**Irritation**

Skin (rabbit): 500 mg/24h - mild

Eye (rabbit): 20 mg/24h - moderate

See RTECS AK 1500000, for additional data.

Section 12 - Ecological Information**Environmental Fate:** No data found.**Ecotoxicity:** TL_m Pimephales promelas (fathead minnow) 0.88 ppm/96 hr (soft water) /Conditions of bioassay not specified**BCF:** zinc accumulates in some organisms**Section 13 - Disposal Considerations****Disposal:** Recycle wherever possible or consult manufacturer for recycling options.

Follow applicable federal, state, and local regulations.

Bury residue in an authorized landfill.

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:** None**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 as Compound**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.

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Appendix H

Tailgate Health & Safety Meeting
Form

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:

	Doc #		Doc #
<input type="checkbox"/> Not applicable	Doc # _____	<input type="checkbox"/> Working at Height	Doc # _____
<input type="checkbox"/> Energy Isolation (LOTO)	Doc # _____	<input type="checkbox"/> Excavation/Trenching	Doc # _____
<input type="checkbox"/> Mechanical Lifting Ops	Doc # _____	<input type="checkbox"/> Overhead & Buried Utilities	Doc # _____
		<input type="checkbox"/> Confined Space	Doc # _____
		<input type="checkbox"/> Hot Work	Doc # _____
		<input type="checkbox"/> Other permit	Doc # _____

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

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Appendix I

Real Time Exposure Monitoring
Data Collection Form



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 3):

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Appendix J

Emergency Action Plan and Route
to Hospital

EMERGENCY ACTION PLAN

Emergency Contact List

Emergency Contact	Phone
Local Police	911 (if appropriate) and 845.856.5101
Local Ambulance	911 (if appropriate) and 845.858.0954
Local Fire Department	911 (if appropriate) and 845.858.4011
Local Hospital (Bon Secours Community Hospital)	845.858.7000
Local Weather Data	www.weather.com
Poison Control	800.332.3073
National Response Center (all spills in reportable quantities)	800.424.8802
U.S. Coast Guard (spills to water)	800.424.8802
NYSDEC Spill Hotline	800.4577362
Project Manager (Andrew Corbin)	315.671.9275 (office) 315.857.8697 (cell)
Site Manager (Craig Massaro)	212.682.9271
H&S Manager (Chuck Webster)	315.671.9297
Client Project Manager Contact (Maribeth McCormick)	845.783.5534 (office) 914.557.1361 (cell)
Client H&S Contact (Mark Travers)	845.342.8952 (office) 914.447.6918 (cell)

List the Emergency Notification Procedure for the project:

- Step 1: Dial 911 (if necessary) and/or Work Care 800-455-6155
- Step 2: Contact PIC/PM/TM
- Step 3: Contact H&S Manager
- Step 4: Contact Near Loss Reporting Hotline 866-242-4304

If emergency attention is not needed but professional medical attention is necessary, the employee will be taken to (see hospital route):

Medical Facility: Bon Secours Community Hospital
 Address: 160 East Main Street
 Port Jervis, NY 12771-2245
 Phone Number: 845.858.7000

Emergency Supplies and Equipment List

Emergency Supplies and Equipment (check all that apply)	Location on Project Site
<input checked="" type="checkbox"/> First Aid Kit (type):	Vehicle/Field Kit
<input checked="" type="checkbox"/> Fire Extinguisher	Vehicle
<input checked="" type="checkbox"/> Mobile Phone <input type="checkbox"/> Satellite Phone	Vehicle/Field Kit
<input checked="" type="checkbox"/> Traffic Cones	Vehicle
<input type="checkbox"/> Walkie Talkies	
<input checked="" type="checkbox"/> Water or Other Fluid Replenishment	Vehicle/Field Kit
<input type="checkbox"/> Eye Wash/Quick Drench Station	
<input checked="" type="checkbox"/> Eye Wash Bottle	Vehicle/Field Kit
<input checked="" type="checkbox"/> Wash and Dry Towelettes	Vehicle/Field Kit
<input checked="" type="checkbox"/> Sunscreen (SPF 15 or higher)	Vehicle/Field Kit
<input checked="" type="checkbox"/> Insect Repellant	Vehicle/Field Kit
<input type="checkbox"/> Chemical Spill Kit	
<input type="checkbox"/> Other (specify):	

Directions to the Hospital

A 16 Pike Street, Port Jervis, NY 12771

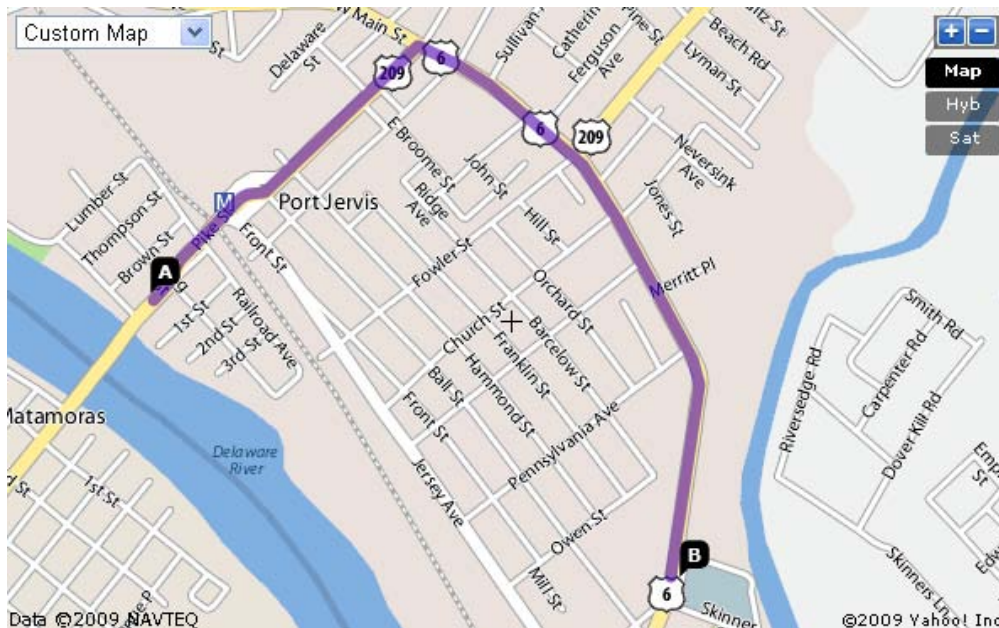
B 160 East Main Street, Port Jervis, NY 12771

Distance: 1.35 Miles

Approximate Travel Time: 5 minutes

Your Directions

1. Start on **PIKE STREET** going toward **KING ST** – go 0.49 miles
2. Turn **R** on **EAST MAIN STREET (US-6)** – go 0.86 miles
3. Arrive at **160 EAST MAIN STREET, PORT JERVIS, NY** on the **L**



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Appendix K

O&R Safety Guideline

SAFETY GUIDELINE

ORANGE AND ROCKLAND

CONTRACTOR RULES

ENVIRONMENTAL, HEALTH AND SAFETY DEPARTMENTS

SG 1040.5

Replaces SG 1040.4

1.0	<u>CONTENTS</u>	<u>SECTION</u>
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	Contractor/Subcontractor Required Safety and Environmental Practices	3.0
	Contractor Personnel to Supplement O&R Workforce	4.0
	Contractors Working in Conjunction with O& R Personnel	5.0
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	Environmental / Health and Safety Plans (eHASP) Approval Process	18.0
	Special Work Situations	19.0
	Work Permits	20.0
	Contractor Rating Procedures	21.0
	EH&S Compliance Assessments	22.0
	Contractor Guideline Checklist	Attachment 1
	Facility Services Work Permit	Attachment 2
	Contractor Performance Rating Form	Attachment 3

APPROVAL: _____



Daniel P. Morales
Manager of Health and Safety

DATE: September 1, 2008

2.0 INTRODUCTION

Orange and Rockland Utilities (O&R) frequently uses outside contractors and/or subcontractors to perform work at its facilities. There are times when these contractors perform work, which can impact O&R employees and properties as well as the general public. During these times, O&R insists that certain safe and environmentally compliant practices be followed in addition to the ones the contractor is required by law or contractual obligation to follow. This Contractor Guideline outlines these minimum safety and environmental requirements and is intended for use by all Company personnel who control or supervise contractors/subcontractors. The Guideline is intended to supplement rather than replace applicable Federal, State or local regulations.

This Guideline also defines the function and responsibilities of the O&R Contractor Representative (Coordinator)* with regard to safety, health and environmental issues. The O&R Contract Representative (Coordinator) is the Company identified intermediary between the contractor and the O&R site management. All contact with a contractor must be through this individual. Except in imminent danger situations, corrections of safety and/or environmental infractions will occur through this individual.

This Guideline applies to all situations where the contractor is actively performing work for O&R. Failure to comply with this Guideline can result in immediate removal of a contractor from the job site.

***In some situations the term “Coordinator” would apply to contractor i.e. National Field Services employees. When so stipulated these contractors will have the same responsibility and authority of an O&R coordinator.**

3.0 CONTRACTOR/SUBCONTRACTOR REQUIRED SAFETY AND ENVIRONMENTAL PRACTICES

Prior to a Contractor being considered by Purchasing for solicitation of bids, CECONY EH&S must prescreen and accept all potential contractors general EH&S policies and procedures. Each O&R Purchase Order has a section, which requires compliance with various safety/environmental rules and regulations. Specifically, excerpts from Article 8 of the Terms and Conditions Purchase Order states that:

By accepting this order, Seller represents, warrants and agrees that it will at all times in the performance of this order comply with all Federal, State and local laws, rules, and regulations including but not limited to any provisions with respect to labor relations, minimum wages and hours or other matters relating to employment and with respect to occupational safety and health.

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Without limiting the foregoing, Seller represents, warrants and agrees that: . . . (ii) It will comply with the Occupational Safety and Health

Act of 1970 (“OSHA”), New York State Labor laws, Section 200, 240, 241, and 241A, and the regulations and standards issued there under, and all items furnished under this order shall comply with all applicable provisions of

OSHA and the regulations and standards issued there under. Seller shall require these warranties of adherence to OSHA from each subcontractor and supplier it employs in the performance of this order.

In addition to the general safety requirements set forth in the purchase order, the Company’s General Terms and Conditions attached to a Request for Proposal, and specific technical specifications, detail procedures and measures to protect the environment.

Prior to the commencement of work the O&R project coordinator shall inform the contractor of its obligation to take all necessary precautions to insure the safety of all persons and protection of the environment and property at, on or about the worksite. Furthermore, the contractor shall erect and maintain all necessary and advisable safeguards required by the conditions and progress of the work, and implement all safety and environmental requirements associated with the technical specifications.

4.0 CONTRACTOR PERSONNEL TO SUPPLEMENT O&R WORKFORCE

Contractors hired essentially to supplement O&R’s existing workforce, and who would be working under O&R supervision, are subject to the same safety and environmental rules and regulation as O&R employees. O&R supervisors shall inform these contractors of the safety and environmental requirements and shall provide them with a copy of all appropriate rules, procedures and policies.

5.0 CONTRACTORS WORKING IN CONJUNCTION WITH O&R PERSONNEL ON SAME JOB

Contractors working in conjunction with O&R personnel, shall follow all O&R safety and environmental rules (in addition to the safety and environmental practices already stated herein) so that continuity of safety and environmental protection is maintained within the scope of the job being performed.

6.0 CONTRACTORS HANDOUT

This Guideline is to serve as a handout to contractors retained by O&R. The O&R Contractor Representative (Coordinator) responsible for the contractor, shall become familiar with this material for all appropriate action and enforcement.

7.0 GUIDANCE

The Safety and/or Environmental Service Departments will provide interpretation and guidance on the content of this Guideline.

8.0 RULES AND REGULATIONS - GENERAL

Contractor shall comply with all applicable laws, ordinances, rules and regulations, including without limitation compliance with all regulations and training requirements applicable to safety, health and the environment. Contractor shall give required notices, shall procure and pay for all necessary municipal and governmental permits (unless provided by the Company), licenses and inspections.

9.0 SAFETY AND ENVIRONMENTAL RULES AND REGULATIONS FOR CONTRACTORS

It shall be the responsibility of the contractor, or their designated representative, to inform its employees and all of its subcontractors of all applicable safety and environmental rules and regulations and to enforce same.

O&R reserves the right to have removed from a site any contractor whose personnel do not comply with safety and environmental rules and regulations.

10.0 PERSONAL PROTECTIVE EQUIPMENT - GENERAL

The contractor is responsible for supplying personal protective equipment to its employees and to ascertain that its personnel wear any protective equipment that is required by federal, state and local laws, and Company rules and regulations. It is Company policy that protective equipment SHALL NOT be loaned to contractor personnel.

The contractor and its representatives are responsible for complying with all posted warning signs relating to personal protective equipment, on or at any O&R facilities.

All contractors working in proximity to voltages above 50kv are required to wear non- synthetic clothing. Clothing must not have any screening and be of a natural fiber. Contractors working on or in proximity to energized sources in locations such as Office facilities, warehouses, garages, shed etc. Will comply with the apparel requirements of NFPA 70E. In other locations such as substations contractors will be required to comply with O&R's clothing program.

11.0 ORANGE AND ROCKLAND CLEARANCES AND/OR WORK PERMITS

When a contractor requires transmission and / or distribution line clearances and/or permits for work at or on O&R facilities, these clearances and permits shall be obtained and coordinated through the assigned O&R Contractor Representative (Coordinator).

No person or equipment or any other conductive object can be operated or brought closer to energized lines or exposed live parts as set forth in the appropriate OSHA standard for the work being performed.

12.0 ASBESTOS REMOVAL / DISPOSAL

Any asbestos removal and/or renovation shall be in conformance with all NYS Rule 56 and OSHA regulations and any other federal, state and/or local requirements. The contractor must provide copies of all appropriate licenses/permits and certifications prior to commencing work.

Contractors involved in the removal & handling of coal tar wrapped pipe must comply with O&R's Gas Operations procedure 103-1

Before removal/renovation is performed the contractor shall notify the assigned O&R Contractor Representative (Coordinator) who will notify the O&R Environmental and Safety Departments so that proper notifications, procedures and disposal arrangements can be verified and approved. No work involving asbestos may be initiated without the review and approval of the Safety and Environmental Services Departments.

Copies of air monitoring and bulk sampling shall be supplied to the Safety Department by the contractor via the designated O&R Contractor Representative (Coordinator) upon receipt of same from the test laboratory. Copies of waste and or Asbestos disposal manifest and or shipping papers shall be provided to Environmental Services.

13.0 WASTE DISPOSAL

All waste materials on-site shall be properly protected and labeled and contained to prevent contamination to soils and/or surfaces or ground water. The Contractor shall dispose of all hazardous and non-hazardous waste in accordance with applicable Federal, State and local laws and regulations. Prior to disposal, Contractor shall provide the Company with waste handling procedures and names of all disposal facilities for verification and approval. Copies of waste disposal manifest and or shipping papers shall be provided to Environmental Services.

14.0 CHEMICAL AND/OR OIL SPILLS

No substance or material shall be discharged to any stream, river, lake or other body of water which may pollute the water or constitute substances or materials which may be or become harmful to fish or wildlife.

In the event of any spill or leak, site personnel will locate source of spillage and stop flow if it can be done safely, and if properly trained, begin confinement and containment. Any chemical and/or oil spills shall be reported and cleaned immediately in conformance with all applicable Federal, State, O&R and local requirements. When a spill occurs, the assigned O&R Contractor Representative (Coordinator) shall be notified immediately, who will in turn notify the O&R Environmental Services and Safety Departments so that proper notifications and procedures can be instituted.

15.0 CONTRACTOR ACCIDENTS

When contractor personnel have an accident, which involves: the public, results in an injury, electrical contact at O&R's facilities, any significant gas related accident or affects the environment, the assigned O&R Contractor Representative (Coordinator) must be notified immediately. This person in turn, will notify the Safety, Risk Management and Environmental Services Departments, as appropriate, for the incident. Incidents that did not cause injury or property damage, but easily could have, are to be reported as well. Written notification shall occur within 24 hours of the incident.

The contractor shall be provided with a list of emergency phone numbers to be used for the specific work area by the O&R Contractor Representative (Coordinator).

Contractors who are working in the capacity of operations, maintenance or emergency response functions on Orange and Rockland Utilities, Inc. gas systems, are mandated under DOT regulations to have in place, anti-drug and alcohol misuse prevention programs in compliance to 49CFR 199 RSPA and 49CFR 382 FHWA. Part of this regulation requires that personnel be drug and alcohol tested on a post accident basis, provided that the incident resulted in the death, hospitalization, or property damage in excess of \$50,000.00, or was considered a "significant" event by the operator (O&R). Drug tests must be performed within thirty-two (32) hours of the incident and alcohol tests need to be conducted within two (2) hours of the incident. All gas contractors are reminded that they are directly responsible for implementing post accident testing according to these regulations and that their performance in such circumstances will be monitored for compliance by O&R. Additionally, all contractors who have employees who are required to have a commercial drivers license and who are covered by the Department of Transportation Federal Highway Administration 49CFR 382 shall also maintain a drug and alcohol program in compliance to this standard. The Contractor's

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written program, in compliance to these DOT standards, will be reviewed and approved prior to working for O&R.

16.0 ACCESS TO ORANGE AND ROCKLAND COMPANY BUILDINGS

Neither the contractors nor any of their representatives shall have access to any O&R buildings or operation areas located on the property, except as necessary and authorized for properly fulfilling the conditions of the contract. In no case shall the contractor permit its work, equipment or materials to interfere with existing equipment and/or operations.

17.0 REGULATORY INSPECTIONS

If any OSHA Compliance Officer, NYSDEC Law Enforcement Officer, or regulatory (EPA, NJDEP, NYSDEC, Local Health Department) staff comes on site for an investigation and/or inspection, the O&R Contractor Representative (Coordinator) must be notified immediately. The O&R Contractor Representative (Coordinator) will notify the Safety or Environmental Services Department as appropriate

18.0 ENVIRONMENTAL/HEALTH & SAFETY PLANS Approval Process (eHASP)

18.1 Contract projects requiring Pre-approved General Environmental /Health and Safety Plans (eHASP)

Effective January 1, 2006, eHASP's shall be required for all referenced (see ref. list) contracts and projects prior to including contractor on the bidders list. The eHASP shall be submitted in writing to EH&S for review and approval at the earliest possible date but no later than 30days prior to assignment to the bidders list.

Contractors whose names currently exist on the bidders list will submit General eHASP when bidding on any project after January 1, 2006.

General eHASP plans that have been reviewed and approved by CECONY will be acceptable to O&R as meeting the requirements of 18.1

The written program must outline basic contractor management and employee responsibilities, alcohol and drug program if applicable, safety procedures, accident investigation, inspection, emergency response, training and control of special procedures (i.e. confined space, lockout/tagout, line-breaking, open flame, spill or material release, dust control, surface and ground water control, decontamination and sampling).

The training portion must clearly demonstrate that the contractor has provided adequate training to all contractor employees regarding any and all chemicals with which they may come in contact while at this job site. Documentation of the training will be provided to the O&R Contract Representative (Coordinator) prior to acceptance of the eHASP.

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After approval of the submitted General eHASP, the contractor will be added to the approved contractor bid list for the specific type work. It is understood that very small

contractors that are self-employed may not have comprehensive plans as outlined above. However these contractors shall comply with the site-specific plan requirements indicated in section 18.2.

Mutual Aid Responders will be exempt from all eHASP obligations as defined in this guideline. The requirement to ensure that mutual aid responders are “qualified” as defined by the appropriate regulation will be the obligation of the respective organization. The term mutual aid responder as applied in this guideline defines workers of other utilities and contractors whose business model is similar to O&R’s.

- Gas work requiring coverage by DOT RSPA Alcohol & Drug Testing. *
- Asbestos abatement.
- Lead abatement.
- Mold Abatement
- Hazardous material spill response, cleanup, handling / transporting and disposal*
- Blood born pathogens cleanup and waste disposal.
- Roofing and roof repair.
- Environmental remediation projects i.e. MGP
- Painting (major projects)
- Confined space entry.
- Excavation / trenching / shoring. *
- Cleaning service/janitorial contractors. *
- Tele-communications contractors.
- Substation / Distribution / Transmission / Construction / Maint contractors. *
- Facility construction/renovations/Maintenance
- Fork lift and crane operations.
- Sand / media blasting.
- Major blacktopping operations.
- HVAC repair and Maint. *
- Line Clearance / Line Maint. *
- For projects not listed contact EH&S for guidance

*Denotes work, which only requires a general eHASP unless the nature of work changes significantly.

18.2 Site Specific Environmental Health and Safety Plans (Site specific eHASP)

For certain projects, a site-specific eHASP will be required. The differentiation between a General and Site-specific eHASP is that site-specific eHASP focuses on a specific project of a limited duration. A General eHASP is typically used for on going or routine work of a similar nature such as janitorial services, scheduled HVAC maint etc. A site-specific

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eHASP is required when work expands or is different from tasks outlined in the Contractor's General eHASP

Upon award of the contract for a specific project, a written site-specific eHASP will be submitted to EH&S representatives for review and approval. The eHASP should be submitted at the earliest possible date but **MUST BE SUBMITTED A MINIMUM OF 30 DAYS** prior to the expected start date of the project. **Upon submittal of the eHASP the responsible EH&S personnel will work with the project coordinator to address any concerns and approve or deny authorization within two weeks from the date of submittal. Responsibility for procuring the site-specific eHASP and forwarding a copy** to EH&S will lie with the O&R contractor coordinator for the project. O&R project coordinators can access General and job/site-specific eHASP forms on line. In some instances a pre-job meeting may be required to address specific concerns on the part of EH&S and/or to address any contractor questions. The O&R project coordinator will be responsible for coordinating these efforts to streamline the eHASP approval process.

Site-specific eHASP's require that the contractor designate an on site contractor EH&S representative.

The approved eHASP will require a sign off by the designated contractor EH&S representative, O&R EH&S representatives and the O&R project coordinator. **Any changes to an approved eHASP must first be reviewed and approved by all signatories prior to implementation**

Upon approval of the eHASP, and prior to the commencement of work, the O&R contractor coordinator will be responsible for completing the Contractor Guidelines Checklist (see attachment 1) with the contractor's EH&S Representative. All sections of the checklist must be reviewed and filled in. The sections of Attachment 1 that do not apply to the site or job shall be marked N/A for not applicable.

Prior to the commencing work, the contractor will obtain from the O&R project coordinator, all pertinent job and site information such as on site chemicals, hazards and any other relevant information that the contractor should be aware of. **The contractor must inform O&R of, and acquire prior approval for all chemicals that the contractor intends** to store and/or utilize on the job site. Request for chemical approval must be submitted in advance utilizing appendix forms A&B of O&R's chemical review procedure, which can be found online. **This approval request must be submitted a minimum of 30 days in advance of the start of any work.** Under no circumstances will any chemical be brought on site prior to receiving written approval. Details on the usage of these chemicals along with all applicable MSDS must be included in the site-specific eHASP.

On any multi-employer/contractor worksite, all persons shall be made aware of the nature of one another's work and the potential hazards existing or generated from each.

18.3 Emergency Work eHASP Approval

EMERGENCY WORK is defined as work that requires immediate 24 Hr. uninterrupted activity or is directed/required by a regulatory agency.

In situations that require the awarding of a contract on an expedited basis and therefore do not permit the required one-month advanced submittal for eHASP review and approval the following will apply. The requesting department will submit the eHASP at the earliest possible date. The eHASP will specify the nature of the emergency and the time schedule for commencing and completing the work. The requesting department will make itself available to EH&S representative to address any questions and or concerns. EH&S representatives will endeavor to review and approve the eHASP within a time frame that will not unduly delay the start of the project. **Any changes to an approved emergency eHASP must be reviewed with the appropriate parties prior to implementation.** If circumstances warrant, emergency approval can be granted over the phone with hard copy to follow.

19.0 SPECIAL WORK SITUATIONS

Certain projects, such as those identified below require the primary contractor EH&S representative to consult with the O&R project coordinator to discuss special work requirements:

- A. Work in Electric Substations.
- B. Work in and Around Gas and/or Propane Stations.
- C. Work involving or near any overhead and/or underground transmission and/or distribution gas and/or electric lines.
- D. Work in storage yards.
- E. Work requiring lockout/tagout, confined space entry and/or trenching/shoring.
- F. Work in or around rotating or reciprocating machinery.
- G. Work in and around building piping and wiring.
- H. Work in and around gasoline and diesel pumping facilities.
- I. Work requiring permits or clearance.

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- J. Work being performed in an administrative area concurrent with employee occupancy.

- K. Work involving the use of chemicals, chemical mixture or potential hazardous material (i.e. pesticide use).

- L. Work requiring environmental permits

- M. Work in environmentally sensitive areas requiring special construction measures to protect soil, water and wildlife.

- N. Work requiring hazardous or regulated waste handling, storage and/or disposal.

20.0 WORK PERMITS

A. Equipment is not to be tagged out or any work permits issued in the name of an outside contractor. Work permits can only be issued to O&R personnel who are responsible to the Location Management. The issuance of a work permit is contingent upon an approved eHASP. The O&R project coordinator shall be called the Permit Holder. The Permit Holder shall issue the permit to the O&R Contractor Representative (Coordinator) who will be responsible for the actions of the contractor working under the permit. The O&R Contractor Representative (Coordinator) shall work with the Permit Holder to coordinate contractor permit requests.

The contractor must be issued a copy of the Permit Holder's permit before work is allowed to start. The contractor must return his copy of the permit to the O&R Contractor Representative (Coordinator) who will return the permit to the Permit Holder when work is completed. The Permit Holder will verify that the work has been completed before the permit is cleared. A permit must be renewed at the end of each shift unless specific alternate arrangements have been made.

B. Confined Spaces

A confined space means a space in which, because of its construction, location or content(s), the accumulation of hazardous gas, vapor, dust or fume, or the creation of an oxygen deficient/enriched atmosphere may occur. "Confined Spaces" include but are not limited to storage tanks, bins, sewers, in ground vaults, boilers, tunnels, manholes, pits, generators, transformers, etc.

Before entering a "Confined Space", the Permit Holder must be notified of intent of entry. The Permit Holder will review the safe entry requirements that include completion by the contractor's personnel of the following items:

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1. Removal of Contents
2. Isolation
3. Electrical Lockouts

4. Testing Atmosphere
5. Continuous Monitoring
6. Ventilation
7. Attendant
8. Safety Gear and Personal Protective Equipment
9. Emergency Planning

A confined space entry permit must be issued prior to the start of the job.

C. Control of Energy Sources

Whenever a contractor's work will involve energized circuits or systems, the contractor shall have a formal lockout/tagout procedure to control the inadvertent exposure to those energy sources. Contractor employees shall be qualified to a level commensurate with the level of work to be performed. All lockout/tagout operations are performed under a written work permit.

D. Contractor Interface

If the contractor has any questions, he/she is to contact the O&R Contractor Representative (Coordinator) who will contact the Permit Holder. Contractor personnel shall not begin any job until they have a clear understanding of the safety and environmental procedures to follow.

Safety and environmental performance checks will be made by the O&R Contractor Representative (Coordinator) and the Permit Holder as often as necessary to assure compliance with required safety and environmental standards for the protection of O&R personnel and property.

E. Facility Services Department Work Permits

Any contractor who performs work on or in any employee occupied company property shall obtain and complete a Work Permit work from the Facilities Services Department. A copy of the Facility Services Work Permit can be found at Attachment 2. The Facility Services Department Management will review the work and permits to determine what impact the work and/ or process may have on Company operations and/or employees. The O&R project coordinator or the Contractor shall post the Facilities Services Work Permit at the project site and the Contractors Guidelines Checklist as shown in Attachment 1 shall be completed. See Section 18.2 for further information on completion of the checklist and pre-requisite eHASP approval.

21.0 CONTRACTOR RATING PROCEDURE

The O&R Project Manager will complete the Contractor rating form that is included as Attachment #3 at the completion of the job or twice a year for long-term contracts.

See Attachment # 3

Note: CECONY's Contractor Oversight System will supersede O&R's rating procedure once implemented in January 2006

22.0 EH&S COMPLIANCE ASSESSMENTS

Representatives of the Safety and/or Environmental Services Departments will conduct periodic inspections to ensure compliance.

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ATTACHMENT 1
CONTRACTOR GUIDELINES CHECKLIST

Job: _____ Location: _____ Date: _____
Contractor: _____ Contractor
Personnel: _____

Policy and Equipment

Reviewed

- ___ Contractor will comply with all applicable Federal, State, and Local Laws including, but not limited to, OSHA, and will comply with Orange and Rockland's Safety Rules and Regulations.
- ___ Contractor will not use any O&R safety equipment or PPE. In situations that require the loan on an O&R tool or piece of equipment, the O&R project coordinator shall request approval from his manager or director.
- ___ Traffic and pedestrian control- contractors will comply with all federal, state and local regulations governing work on public roadways and highways.
- ___ No hazardous material may be brought into the work environment or to the job site without prior O&R review and approval. MSDS and /or product labels are to be provided for review and approval.
- ___ Contractor has been made aware of all hazardous material and/or processes, if any, in the work area.
- ___ On a Multi-employer work site, information regarding the nature of each contractor's work, hazardous material utilized on site and any other potential hazards will be exchanged.
- ___ Contractor has informed any employees, and all sub-contractors of the rules and regulations contained herein.
- ___ Contractor not engaged in asbestos work, shall not disturb any material labeled as asbestos containing. When a contractor encounters asbestos or similar material suspected of containing asbestos, the contractor shall notify the O&R representative and cease all activity around site. All asbestos-related work shall be done in compliance to NYS Rule 56, or when in New Jersey or Pennsylvania, the appropriate state regulations and OSHA standards. The only exception to this rule is coal tar coating containing asbestos. In this case, contractor will follow requirements of NYS waiver and all associated O&R work procedures.
When penetrating any material (i.e. drilling, cutting, demolition, etc.), has the material been identified as not containing any hazardous material such as but not limited to, lead, asbestos, PCB, etc. Check answer YES ___ or NO ___. If answer is NO, material content shall be identified prior to starting job.
- ___ Contractor has been informed that any work involving Coal Tar Wrapped Piping must comply with O&R's procedure 1030-1.

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- ___ Contractor has been informed to comply with O&R's Lead procedures and OSHA standards 1910.1025 & 1926.62.
- ___ Contractor will obey all alarms and evacuation orders and will move to safe areas until permitted to return.
- ___ Wearing of eye protection is mandatory in all areas where hazard(s) to the eyes is present and on all construction sites. Cover-all goggles are required when using tools to grind, chip, cut, or break up material, etc.
- ___ Contractor shall supply first aid services to its employees and provide standing arrangements for adequate medical care and for removal and hospital treatment for its sick or injured employees.
- ___ Non-metallic hard hats in conformance to OSHA must be worn while working at any site.
- ___ Approved steel or fiberglass toe safety shoes are required (OSHA 1910.136).
- ___ Clothing worn for the job shall comply to applicable OSHA/O&R standards for work being performed.
- ___ Hearing protection is required in posted areas and when using equipment which requires such use.
- ___ All respirator users shall be in compliance to the OSHA standards covering such use.
- ___ Confined space entries are to be in compliance to OSHA confined space entry standard and reviewed with the O&R representative.
- ___ Scaffolds and scaffolding procedures must comply with OSHA standards.
- ___ Overhead work is prohibited above unprotected personnel. Unnecessary tools and parts shall not be staged in overhead locations.
- ___ Appropriate fall protection shall be used when a fall hazard exists. **(See O&R Fall Protection Guideline # SG 1038.1)**
- ___ All lockouts or tagouts of utilities will consist of dual applications by contractor and O&R personnel.
- ___ Only authorized and qualified personnel shall work on electrical equipment – all work to be performed in conformance with OSHA and NEC specifications.
- ___ Contractor will provide fire watch as required; welding areas will be properly barricaded; combustibles will be protected and gas cylinders will be stored in accordance with OSHA standards.
- ___ Fire extinguishers are to be present when working with live gas.
- ___ When cutting, burning, or welding overhead, a fire watch will be stationed below with an approved extinguisher.

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- ___ Contractor will provide their own fire extinguisher. O&R extinguishers shall not be removed from their stations unless it's an emergency or if contractor's extinguishers have been exhausted.
- ___ Flammable liquids shall be brought on site in small quantities and in approved containers only. If required, a storage area will be selected by O&R and materials will be stored in accordance with O&R requirements.
- ___ Painting or work which will produce, toxic vapors/fumes in employee work areas will require proper ventilation. Under no circumstances will employees be exposed to toxic fumes.
- ___ Trenching and shoring will conform to OSHA regulations.
- ___ Good housekeeping practices will be strictly adhered to; the work site shall be cleaned at the end of every shift.
- ___ Cords and hoses will be situated as best to eliminate tripping hazards. All openings, tripping hazards, or slipping conditions must be immediately barricaded.
- ___ Ladders shall have safety feet and metal ladders may not be used in proximity to energized electrical facilities.
- ___ All vehicle operators will be properly licensed; all vehicles/equipment must be equipped with back-up alarms or operated using a spotter.
- ___ Possession of alcohol or controlled substances is strictly prohibited and reporting to work under the influence of drugs or alcohol is prohibited.
- ___ All hazardous wastes will be identified, properly handled, containerized, labeled, and disposed of according to applicable Federal, State and local regulations.
- ___ Before disposal of any non-hazardous and hazardous wastes, O&R Contractor Representative will be notified; Company will approve of intended disposal site (s). Copies of all manifests and shipping papers will be provided to the O&R Contractor Representative.
- ___ Contractor will utilize all measures necessary to prevent accidental spill, release or discharge of hazardous materials to the environment.
- ___ Contractor will immediately notify the O&R Contractor Representative and appropriate regulatory agencies of any chemical and/or oil spills.
- ___ If properly trained and/or properly licensed/certified as appropriate, Contractor will clean any spill to the environment; if not trained and/or properly licensed/certified as appropriate, Contractor will make arrangements to employ a properly licensed/certified as appropriate sub-Contractor to perform necessary work.
- ___ Contractor shall perform all construction work in accordance with all applicable Federal, State, and local environmental permits (i.e. Wetlands, Stream encroachment).
- ___ Any Contractors applying pesticides shall be a registered pesticide business.

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- ___ All herbicide applications will be made under the supervision of a certified / competent person, and in accordance with label directions.
- ___ Contractor will control all odors, dust, and fugitive emissions from job site.
- ___ The use of Powder Actuated Hand Tools must receive prior approval from EH&S and– Proper training and certification. Must be provided with the eHASP
- ___ Contractor will provide all necessary measures to maintain soil and erosion control to prevent contamination of surface and ground water.
- ___ Contractor shall maintain all equipment and conduct operations to minimize impacts to the environment.
- ___ Emergency Contact numbers and hospital routes are attached.

ADDITIONAL SECTION FOR ASBESTOS ABATEMENT CONTRACTORS / JOBS

- ___ Contractor employee training.
- ___ Contractor Asbestos License.
- ___ Asbestos Handling Certifications
- ___ Contractor Supervisor Certification.
- ___ Project monitor and air sampling technician.
- ___ EPA notification.
- ___ NYSDOL notification.
- ___ Demolition notification, as applicable, building inspector, town clerk, etc..
- ___ Copy of Asbestos Handling Guideline SG 1014-3 supplied contractor.
- ___ Building occupant notification and posting(s).
- ___ Multi employer worksite notification.
- ___ Waste holding site.
- ___ Waste manifests.
- ___ Pre-abatement air monitoring.
- ___ Clearance air monitoring.

SIGNED: Contractor Representative _____ **Date** _____

O&R Representative _____ **Date** _____

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ATTACHMENT 2
Orange and Rockland Utilities
INTERNAL WORK APPLICATION / PERMIT

PERMIT NUMBER: _____

DATE ISSUED: _____

Project
Location; _____

Originating Department: _____

Department Contact Person _____ **Ext:** _____

Pager: _____ **Cell:** _____

EHASP approved Yes ---- No---- (if the answer is no ref. To section 20 SG1040.4)

O&R Project Rep.: _____ **Ext:** _____

Pager: _____ **Cell:** _____

General Contractor (GC) Name &
Address; _____

GC Contact Person: _____ **Ext:** _____

Pager: _____ **Cell:** _____

Sub-Contractor(s):

Scope of
Work: _____

Start Date: _____ **Completion Date:** _____

Contractor Safety Checklist Reviewed: _____
Signature Date

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ATTACHMENT 3
CONTRACTOR PERFORMANCE RATING FORM

PLEASE COMPLETE THE FOLLOWING FORM AFTER THE PROJECT HAS BEEN COMPLETED. THIS INFORMATION WILL BE USED TO GENERATE A CONTRACTOR RATING. IF ANY DOES NOT APPLY TO THIS PROJECT, PLEASE ENTER N/A (NOT APPLICABLE) IN THE SPACE PROVIDED.

CONTRACTOR NUMBER: _____

CONTRACTOR NAME: _____

PROJECT:

SPECIFICATION # _____

PURCHASE ORDER: _____

PROJECT MANAGER: _____

FIELD SUPERVISOR: _____

SCHEDULED START DATE: _____

SCHEDULED COMPLETION DATE: _____

ACTUAL START DATE: _____

ACTUAL COMPLETION DATE: _____

RATE CONTRACTOR: E = EXCELLENT G = GOOD F = FAIR P = POOR N/A = NOT APPLICABLE

1) QUALITY AND EFFECTIVENESS OF SUPERVISION _____

2) QUALITY OF WORK PERFORMED _____

3) ABILITY TO COMPLETE WORK SCOPE ON SCHEDULE _____

4) ABILITY TO PERFORM EXTRA WORK WITHOUT CAUSING UNDO
IMPACT ON THE PROJECT SCHEDULE _____

5) ABILITY TO PERFORM EXTRA WORK AT REASONABLE COST _____

6) ABILITY TO PROVIDE SUFFICIENT CRAFT PERSONNEL _____

7) ABILITY TO PROVIDE PRODUCTIVE PERSONNEL _____

8) ABILITY TO RESOLVE TECHNICAL PROBLEMS _____

9) ABILITY TO SOLVE LABOR PROBLEMS _____

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10) ADHERENCE TO RULES FOR SAFE WORK PRACTICES _____

11) OTHER: _____

COMMENTS: _____

PREPARED BY: _____ DATE: _____

THIS FORM SHOULD BE RETURNED TO THE PURCHASING DEPARTMENT WITHIN TEN (10) WORKING DAYS AFTER THE ACTUAL COMPLETION DATE YOU HAVE ENTERED ABOVE.

QU#:

BIDDER LIST:

ARCADIS

Appendix L

Hazardous Materials
Transportation Form



Hazardous Materials Transportation Form

	Vehicle (place X in box)	Type (pick-up, car, box truck, etc.)
Personal		
Rental		
ARCADIS owned/leased		
Government owned		
Trailer		
Materials Transported	Quantity	Storage/Transport Container

List Trained Drivers:

ARCADIS

Appendix M

Hazardous Materials Shipment
Form

ARCADIS

Appendix N

Subcontractor Acknowledgement:
Receipt of HASP Signature Form

