QWDC Parcel 8

BCP # C241087

Long Island City, New York

DRAFT HEALTH & SAFETY PLAN

Prepared for

Sive, Paget, & Riesel, P.C.
460 Park Avenue
New York, New York 10022-1906

FLS Project Number: 10011-019-8

Submitted to:

New York State Department of Environmental Conservation
Division of Environmental Remediation, Region 2
47-40 21st Street
Long Island City, New York 11101-5407

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PROJECT INFORMATION SHEET

Project/Site Name: QWDC Parcel 8

Site Address: 47th Road and Center Blvd., Long Island City (Queens), NY

Project No: 10011-007-2

Client: Sive, Paget, & Riesel, P.C.

FLS Project Manager: Steven E. Panter, CGWP

Date Health and Safety Plan Prepared: 7/14/11

Site Access: Prior Notification Required

Site Size: Approximately 0.73 acres

Site Topography: Flat, Coastal

Site History

Historically, Parcel 8 housed chemical manufacturing and processing operations. Historical maps dating back to 1811 show the site footprint as part of the East River with the original shoreline being near present-day Center Boulevard. It was not until 1898 that the area is shown to have a solid structure belonging to the Warren Chemical Company, a producer of tar paper and asphalt. The structure rested on the man-made shoreline that consisted of extensive fill. The fill raised the surface elevation and expanded the property out into the East River. The site contained pumps, tanks, condensers, dryers, steam stills, and storage areas associated with the production of tar paper and asphalt. The Warren Chemical Company was on Site from 1861 until sometime before 1915. The Liquid Carbonic Company, which produced liquefied carbon dioxide for use in soda fountains, occupied the site from the 1930s until the 1950s. In 1970 the site was occupied by a metal storage warehouse. Hallen Contractors then occupied the site from the 1970s until the site was vacated and all structures demolished in 2001.

According to Sanborn maps dating back to 1898, Parcel 8 had several businesses in the immediate area. The N.Y. Mastics Company Works (the Mastics Company) occupied the area to the north from 1898 to 1915. The Barber Asphalt and Paving Company occupied the space to the south from 1915-1922. The Blau Gas Company of America occupied the area to the east from 1936 to 1950 and is shown to contain a gas holder with internal oil tanks, purifying room with gas tanks, air compressor, and fuel oil retorts according to historical maps. The area to this west was the East River until the area was filled in sometime after 1915, and a park (Peninsula Park) currently occupies the area between Parcel 8 and the East River.

Remediation was completed in 2011 and all future work must be done in compliance with the Site Management Plan (August 2011). The site currently houses the Queens Public Library and a Park Ranger Station.

Description of Specific Tasks

The Site Management Plan (SMP) includes requirements for operation, maintenance and monitoring of the Sub-Slab Depressurization System (SSDS), maintenance of the Site cap and groundwater monitoring. The plan also provides guidance for soil disturbance related to utility repair, landscaping activities, and other renovations/repairs. This environmental Health and Safety Plan (HASP) has been developed as a sample for the SMP. The HASP may need to be altered depending on the work to be conducted. This HASP does not discuss other routine health and safety issues common to general construction/excavation, including but not limited to shoring and other physical hazards.

1.0 INTRODUCTION

Fleming-Lee Shue, Inc. (FLS) prepared this Health and Safety Plan (HASP) on behalf of Queens West Development Corporation (QWDC) for use and implementation by FLS employees and their representatives during subsurface investigation activities performed under the Site Management Plan (SMP) at Avalon Parcel 8, Long Island City, NY. Parcel 8 is located in the Hunter's Point Section of Queens, NY. The parcel is bounded on the north by 47th Road, to the east by Center Blvd., and to the south and west by Gantry Plaza State Park. Figure 1 is a site location map.

The SMP includes requirements for operation, maintenance and monitoring of the Sub-Slab Depressurization System (SSDS), maintenance of the Site cap and groundwater monitoring. The plan also provides guidance for soil disturbance related to utility repair, landscaping activities, and other renovations/repairs. This environmental Health and Safety Plan (HASP) has been developed as a sample for the SMP. The HASP may need to be altered depending on the work to be conducted. This HASP does not discuss other routine health and safety issues common to general construction/excavation, including but not limited to shoring and other physical hazards.

The purpose of this HASP is to identify the real and potential hazards associated with environmental field activities and to stipulate appropriate health and safety procedures, particularly where hazardous materials are potentially present. The procedures and guidelines contained in this document are intended to minimize exposure to chemical, physical, and biological hazards that may be present in the soil, groundwater, or air, and to reduce the potential for accidents and injuries.

The procedures described in this document were developed in accordance with the provisions of Occupational Safety and Health Administration (OSHA) rule 29 CFR 1910.120 and FLS' experience with similar projects. All Site workers must review this generic HASP before entering the Site. The Health and Safety Officer (HSO) or designee will ensure that personnel have reviewed the HASP and will provide an opportunity to ask health and safety questions during attendance at a pre-field safety meeting. Field personnel will sign the acknowledgment form (Attachment I) maintained on-Site during the investigation. The recommended health and safety guidelines in this document may be modified, if warranted, by additional information obtained prior to, or during Site investigation. The Health & Safety Officer (HSO) will also maintain copies of pertinent health and safety records for all field personnel.

The Occupational Safety and Health Act (1970) requires the following:

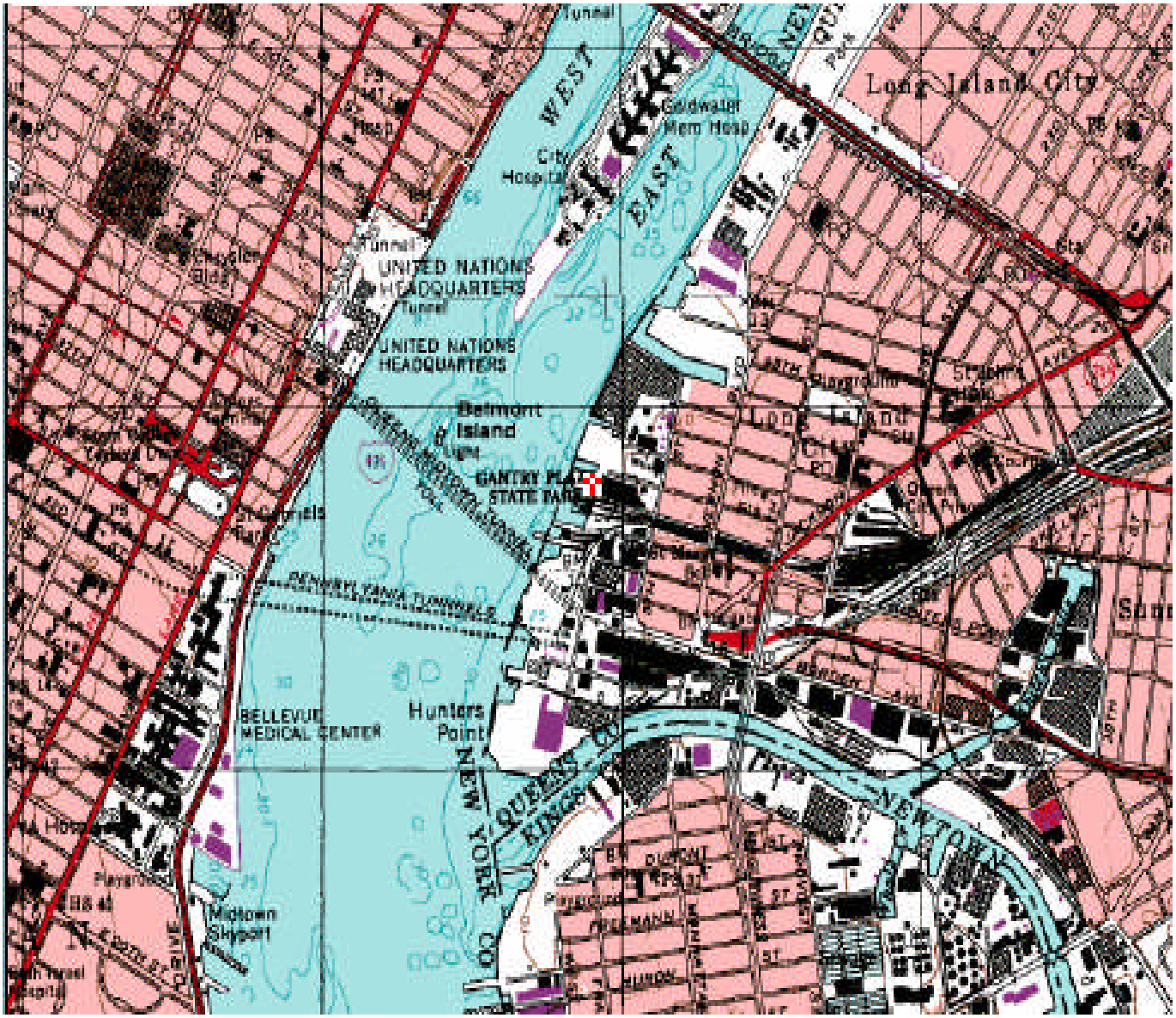
- Employers shall furnish each employee with a place of employment free from recognized hazards that are causing or likely to cause death or serious physical harm.

- Employers must comply with occupational health and safety standards and rules, regulations and orders pursuant to the Act, that are applicable to company business and operations.

- All employees must comply with occupational health and safety standards and regulations under the Act, which are applicable to their actions and situations.

- Employees are encouraged to contact their immediate superior for information that will help them understand their responsibilities under the Act.

FIGURE 1
SITE LOCATION MAP



Fleming Lee Shue

SITE: QWDC Parcel 8
Long Island City, New York

Environmental Management & Consulting, 158 West 29th Street, 9th Floor, New York, NY 10001

1.1 Site Development

The site is developed with the Queens Public Library (no basement) and a park ranger headquarters.

1.2 Site History

Historically the parcel housed chemical manufacturing and processing operations. Historical maps dating back to 1811 show the site footprint as part of the East River with the original shoreline being near present-day Center Boulevard. It was not until 1861 that the area is known to be occupied by the Warren Chemical Company, a producer of tar paper and asphalt. The structure rested on the man-made shoreline that consisted of extensive fill. The fill raised the surface elevation and expanded the property out into the East River.

The site contained pumps, tanks, condensers, dryers, steam stills, and storage areas associated with the production of tar paper and asphalt. The Warren Chemical Company was on Site until sometime prior to 1915. The Liquid Carbonic Company, which produced liquefied carbon dioxide for use in soda fountains, occupied the site from the 1930s until the 1950s. In 1970 the site was occupied by a metal storage warehouse. Hallen Contractors then occupied the site from the 1970s until the site was vacated and all structures demolished in 2001.

Parcel 8 had several businesses in the immediate area. The N.Y. Mastics Company Works occupied the area to the north from 1898 to 1915. The Barber Asphalt and Paving Company occupied the space to the south from 1915-1922. The Blau Gas Company of America occupied the area to the east from 1936 to 1950 and is shown to contain a gas holder with internal oil tanks, purifying room with gas tanks, air compressor, and fuel oil retorts according to historical maps. The area to this west was the East River until the area was filled in sometime after 1915, and a park (Peninsula Park) currently occupies the area between Parcel 8 and the East River.

Remediation was completed in 2011 and all future work must be done in compliance with the SMP (August 2011).

1.3 Summary of Site Investigation and Remediation

Remedial Investigations (RIs) were performed to characterize the nature and extent of contamination at the site. The results of the RIs are described in detail in the following reports:

- AKRF, June 2005. Supplemental Remedial Investigation Work Plan Parcel 8 and Offsite. Project Number 10516.
- AKRF, April 2005. Supplemental Remedial Investigation Report, Queens West Parcel 9.
- AKRF, June 2005. Additional Delineation Testing Report, Queens West Development-Parcel 9, Queens, New York, Project Number 10516.

- AKRF, July 2006. Off-Site Investigation Report, Queens West Development-Parcel 9, Queens, New York, Project Number 10516.
- FLS, 2008, Parcel 8 Supplemental Remedial Investigation Work Plan, July 2008. Project No. 10011-007-1.
- FLS, 2009. Parcel 8 Remedial Investigation Report, April 2009. FLS Project No. 10011-007-1.
- FLS, 2010. Parcel 8 Remedial Action Work Plan, October 2010. FLS Project No. 10011-007-1.

Generally, the RIs determined that the majority of on-site contamination existed between the capillary fringe (approximately 9 ft-bg) and approximately 22 ft-bg beneath the former main operational footprint of Warren Chemical, shown on Figure 2. Some DNAPL existed near the till layer at approximately 30 ft-bg, albeit at a much smaller amount than in the overlying strata.

All of the DNAPL was residual. Numerous attempts to gauge DNAPL accumulation in wells failed to identify measurable NAPL. Visible NAPL occurred in soil borings throughout Parcel 8, mainly in sandy lenses, but the bulk of the contaminant mass was near the contaminant source, the former operational foot print on the southwest and west central part of Parcel 8.

Soils on Parcel 8 were impacted by PAHs from the surface to depth. The shallow surface soils contained some debris and PAHs from a combination of the historic waste and the fill that was brought in to grade the land for development. The surface soil also contained a few scattered areas of metals and PCB contamination.

Groundwater was impacted by BTEX compounds. Dissolved BTEX concentrations were greatest near the southwest portion of Parcel 8. The dissolved concentrations drop off markedly with increasing distance from the source area, and testing was unable to identify BTEX entering surface water. Therefore, based on the results, it does not appear that groundwater has a materially adverse effect off the Site.

Site remediation, conducted in accordance with the NYSDEC-approved Remedial Action Work Plan dated October 10, 2010 occurred in November 2010 through ___. The following is a summary of the Remedial Actions performed at the site:

1. Excavation of the top four feet of soil over the entire area of the Site.
2. Excavation of Hot Spots of metals and PCBs identified during the RI, as well as grossly contaminated soil observed during soil excavation of the top four feet of soil, were removed to a depth where endpoint sample met the Commercial Use SCOs, or to the depth of the water table and/or the maximum depth possible without sheeting or shoring. Soils which were not grossly contaminated below approximately 4 ft-bg, and below Hot Spot excavation areas were not excavated.

3. Collection and analysis of end-point samples subsequent to removal of shallow soil, Hot Spots and gross contamination. Endpoint samples were collected at 4 ft-bg, and along the Site sidewalls and analyzed for VOCs, SVOCs, metals, PCBs, and pesticides/herbicides. In the areas of Hot Spot and gross contamination excavation, endpoint samples were collected at the bottom of the Hot Spot and/or gross contamination excavation and along the sidewalls of each excavation in accordance with the procedures in DER-10, and similarly analyzed.
4. Import of materials to be used for backfill and cover in compliance with: (1) Part 375-6.7(d) and, (2) all Federal, State and local rules and regulations for handling and transport of material;
5. Installation of a demarcation barrier between the residual soil and approved fill material. Hot Spot and gross contamination excavations were filled to 4 ft-bg with soils meeting Part 375-6.7(d) prior to installation of the demarcation barrier.
6. Installation of a composite cover system consisting of, at a minimum, 2 feet of clean soil and/or 6 inches of asphalt or concrete.
7. S-ISCO™ addressed the bulk of the contaminant source mass. The greater part of the mass occurred from approximately 10 ft-bg to 22 ft-bg, (i.e., the treatment zone) and encompassed about 67 percent of the contaminant mass (53,600 pounds). Combined with the removal of the top four feet of soil and the Hot Spot and gross contamination removal, approximately 90 percent of the total contaminant mass was removed or destroyed in place. Additional S-ISCO™ treatment addressed deep contamination atop the till layer near the southwest corner of Parcel 8.
8. Recording of an Environmental Easement requiring implementation of engineering and institutional controls described in a Department-approved Site Management Plan to manage residual contamination.
9. Publication of an SMP for long term management of residual contamination, as required by the Environmental Easement, that: (i) requires installation of an active sub-slab depressurization system and vapor barrier for any occupied buildings constructed on the Site, (ii) details procedures for future maintenance of engineering controls and management of any residual Site contamination and (iii) addresses procedures for future Oxygen Release Compound Advanced™ (ORCA) application, if necessary, including monitoring parameters to prevent migration of contaminated groundwater off site.

In its current condition, Parcel 8 does not pose an adverse threat to public health.

2.0 TASKS TO BE PERFORMED UNDER THIS PLAN

THIS SECTION AND THE FOLLOWING SECTION SHOULD BE TAILORED TO THE WORK TO BE CONDUCTED. The following text is provided as an example.

The tasks to be performed under this plan can be divided into two categories: 1) tasks regulated by The OSHA Hazardous Waste Operations and Emergency Response (HAZWOPER) Standard and 2) tasks not regulated by the HAZWOPER Standard.

2.1 HAZWOPER Regulated Tasks

- Installation of Chemical Oxidation Excitation Wells
- Application of Chemical Oxidation
- Soil Surface Sampling
- Groundwater Sampling

2.2 Non-HAZWOPER Regulated Tasks

- Utility Clearance Oversight

3.0 Potential Chemical, Physical, and Biological Hazards and Controls

This section discusses the potential chemical, physical, and biological hazards and controls associated with the investigation tasks above. A summary of potential site safety hazards and safety requirements is presented in Table 1.

3.1 Potential Chemical Hazards/Controls

Based on data collected during previous investigations at the Parcel 8 Site, this HASP focuses on the following chemicals of concern:

VOCs	SVOCs	Pesticides	PCBs	Metals	Injection Chemicals
Benzene	Naphthalene	Dieldrin	ND to Below TAGM RSCO	Arsenic	Sodium Persulfate
Ethylbenzene	Polycyclic Aromatic Hydrocarbons (PAHs)	Heptachlor Epoxide	--	Copper	Sodium Hydroxide
MTBE	creosote	--	--	Chromium	Catalyzed Hydrogen Peroxide
Styrene	--	--	--	Lead	VeruSol-3™
Toluene	--	--	--	Mercury	--
Xylene	--	--	--	Nickel	--
--	--	--	--	Zinc	--

Attachment II lists the recognized and suspected health hazards, exposure limits, physical and chemical properties, recommended protection levels and symptoms of exposure for the chemicals known or suspected to be present at the site. The chemical hazards will be minimized by limiting exposure of personnel to soil and groundwater and by the use of personnel protective equipment (PPE).

Table 1 - Summary of Site Safety Hazards and Safety Requirements

	Encountered Material Types				Material Characteristics					Chemical Hazards					Physical Hazards														Safety Requirements		
Activity	Liquid	Solid	Sludge	Gas	Corrosive	Ignitable	Volatile	Toxic	Unknown	Volatiles	Semi-volatiles	Metals	PCBs	Other	Heat/Cold Stress	Vehicle/Pedestrian Collisions	Severe Weather	Construction Hazards	Noise	Facility Operations	Unstable Ground	Site Operations	Utilities	Haz. Mtls. Use/Storage	Fire	Slips, Trips, Falls	Cuts, Punctures	Poisonous Plants/Animals	Animal/Insect Bites, Stings	**Protection Level (PPE)**	**Monitoring**	**Personal Decontamination**
Soil Gas Sampling				P			P	P		K	K	K	P	P	P			P	P	P			P			P					D	NA	Wash hands & face after sampling and before eating or drinking
Surface Soil Sampling	K	K	Coal tar DNAPL	P		P	P	K	P	Low level	High Naphtha -lene Levels; PAHs	K		P	P			P	P	High		Drilling, falling objects, power tools	P			K				Level D, must use hearing protection while drilling	Air Monitoring OVM; Dust Trak; Detector tubes for benzene	Wash hands & face after sampling and before eating or drinking
Excavation to 4+ feet bgs		K									Kl	K	K				P			K		Moving Vehicles								D	Air Monitoring OVM; Dust Trak	Wash hands & face after sampling and before eating or drinking
Installation of Remedial Systems & Pilot Test	K	K				K			K		Low level	K	K	K			P			K		Moving Vehicles	K							D	Air Monitoring OVM; Dust Trak	Wash hands & face after sampling and before eating or drinking
Fluid Level Measurement	LNAPL DNAPL			P		P	P	P		K	K				P	P			P			Moving vehicles			P					D	Not required for this activity, exposure potential negligible	Wash hands & face after sampling and before eating or drinking
Groundwater Sampling	K			P		P	P	P		K	K				P	P			P			Moving vehicles			P					D	Not required for this activity, exposure potential negligible	Wash hands & face after sampling and before eating or drinking

K – Known
P - Potential

3.2 Physical Hazards/Controls

Physical hazards potentially present at the site include, but are not limited to, the following:

Hazard	Control
Slip, trip and fall (uneven terrain and slippery surfaces)	Avoid Uneven Terrain, Walk Slowly, Wear Sturdy/Supportive Shoes
Environmental (heat/cold) stress	A discussion of heat stress and cold stress and related illnesses and controls is provided in Attachment III.
Subsurface/Aboveground Utilities	Ensure utility clearance has occurred in drilling area, respect subsurface utility marks. Inspect area where drill rig derrick will be hoisted for utilities.
Vehicular Traffic	Avoid working in high traffic areas. If necessary, use cones, reflective vests, and consider use of a flagman/additional protection.
Fire	Ensure class ABC fire extinguisher is nearby to work area when using equipment that can provide an ignition source (drill rigs, generators, power tools)
Noise hazards	Use ear plugs and/or ear muffs during drilling and boring.
Use of heavy equipment	Stay clear of heavy equipment during operation. Maintain eye contact with operator when approaching equipment.

Anticipated site operations do not include the need for specific operations such as, lockout/tag-out, scaffolds or confined spaces; therefore these items are not addressed in this HASP. If site activities require these operations, properly trained, experienced and competent personnel shall be utilized.

3.3 Biological Hazards/Controls

Hazard	Control
Bites or stings from insects/animals (particularly ticks) resulting in skin inflammation, disease, or allergic response	Keep exposed skin covered. Use insect repellant if necessary. Inspect yourself carefully after work is completed.
Allergens and toxins from plants and animals, producing dermatitis, rhinitis, or asthma	Keep exposed skin covered using proper PPE. Wash hands regularly.

3.4 Levels of Personal Protection

Personal protective equipment (PPE) must be worn as required for each job in all operations where there is an exposure to hazardous conditions. Upon review of contaminant levels, physical

and biological hazards, exposure routes and the nature of the field tasks, it has been determined that Level D protection will be used during field activities with a contingency to upgrade to Level C protection if total organic compound concentrations in the breathing zone consistently reach or exceed 5 parts per million (ppm) as measured with a photoionization detector (PID). If PID readings in the breathing zone consistently reach or exceed 25 ppm, work will be stopped and the Site HSO and Project Manager contacted. Protection levels are described in more detail in Section 4.6 and air monitoring is discussed in Section 6.

3.4.1 Level D

Level D applies to work in areas where the possibility of contact with potentially contaminated groundwater and soil exists. The protective equipment required for Level D includes, but is not limited to the following:

- Work clothes or coveralls
- Safety boots, with steel toe
- Safety glasses
- Hard hat
- Reflective vest
- Disposable latex gloves
- Hearing protection, to be used as needed

3.4.2 Level C

Level C is selected only when the type of material and the concentration are known, and pose a moderate level of respiratory risk to the site worker. Level C is required when PID readings indicate a consistent level of 10 ppm or above of total volatile organics in the worker breathing zone. Level C protection will include, but is not limited to, the following:

- Protective clothing and other equipment required for Level D
- Full-face air purifying respirator (APR) with high efficiency particulate/organic vapor cartridges (ultra-twin with GMCH cartridges)
- Saranex-coated disposable coveralls with hoods
- Boot covers

3.5 General Hazard Controls

3.5.1 General Workplace Safety Rules

- Report unsafe conditions, accidents, injuries, or incidents to the HSO and Project Manager.
- Use eye and/or face protection where there is danger from flying objects or particles, (such as when grinding, chipping, burning and welding, etc.) or from hazardous chemical splashes.
- Dress properly. Loose clothing and jewelry shall not be worn.
- Keep all equipment in safe working condition. Never use defective tools or equipment.

- Report any defective tools or equipment to immediate supervisor.
- Properly care for and be responsible for all PPE.
- Do not leave materials in aisles, walkways, stairways, work areas, roadways, or other points of egress.
- Practice good housekeeping at all times.
- Training on equipment is required prior to unsupervised operation.
- During work, pause every few minutes and assess surrounding conditions.
- Crossing highways and major roadways is not recommended. Expect movement of cars and buses at any time along any roadway, regardless of traffic signals, stop signs, yield signs, etc.
- When walking on right-of-ways or road-shoulders, keep a sharp lookout in both directions.
- For personal safety, be cognizant of your surroundings and ensure that equipment is properly secured.

3.5.2 Housekeeping

- Proper housekeeping is the foundation for a safe work environment. It definitely helps prevent accidents and fires, as well as creating a professional appearance in the work area.
- Material will be piled or stored in a stable manner so that it will not be subject to falling.
- Combustible scrap, debris, and garbage shall be removed from the work area at frequent and regular intervals.
- Stairways, walkways, exit doors, in front of electrical panels, or access to fire fighting equipment will be kept clear of materials, supplies, trash, and debris.

3.5.3 Fire Prevention

- All firefighting equipment shall be conspicuously located, accessible, and inspected periodically, and maintained in operating condition. An annual service check and monthly visual inspections are required for fire extinguisher.
- All employees must know the location of fire fighting equipment in the work area and have knowledge of its use and application.

3.5.4 Industrial Hygiene and Occupational Health

- Toilet facilities shall be provided as required for the number of workers.
- A first aid kit and portable eyewash station shall be kept on site.
- An adequate supply of potable water shall be provided.
- The use of a common drinking cup is prohibited.

- When no medical facility is reasonably accessible (time and distance) to the worksite, a person who has a valid certificate of first aid training will be available at the worksite to render first aid.
- Employees must be protected against exposure to hazardous noise levels by controlling exposure or by use of proper PPE.
- Any FLS Activities will be assessed for lead exposure (particularly if drywall or any painted surfaces or abrasive blasting/grinding is involved) and/or asbestos exposure.

3.5.5 Personal Hygiene

Eating, drinking and the use of tobacco products in the work area are prohibited. The use of alcohol or other non-prescription drugs by personnel that could impair the ability to function at the work site is prohibited. The use of some prescription drugs may impair the ability to function and can create safety problems on-site. Field personnel taking prescription medication should alert the HSO in case of an emergency. Beards or facial hair that could interfere with the use of a respirator are not permitted. Dermal contact with groundwater should be avoided. This includes avoiding walking through puddles, pools, and mud, sitting or leaning on or against drums, equipment, or on the ground. Field personnel should wash their hands before eating, smoking, using the toilet, etc. Field personnel should wash their hands and face and shower (daily) as soon as possible after leaving the site.

4.0 Training, Project Organization, and Personnel

4.1 Training

Knowledge of the safety rules supplemented by compliance is essential to safety. New employees will be provided orientation training and will be furnished information and literature covering the company health and safety policies, rules, and procedures. This orientation training must be provided prior to the employee's visit to the Site.

All employees will have successfully completed the 40-hour OSHA health and safety training for hazardous material sites (29 CFR 1910.120[e][3][i]) and valid/up-to-date 8-hour refresher training (29 CFR 1910.120[e][4]).

Employees must read the HASP and project-specific Work Plan, which contains the applicable regulations/standards for their job.

Prior to beginning work on-Site, and weekly thereafter, the HSO will lead safety-training sessions and/or training meetings. These meetings will be conducted to provide information and training on new equipment, new procedures, new chemicals, refresher/remedial training in specific areas, or meet annual requirements. Such training may be held in conjunction with the safety briefings/meetings addressed elsewhere in this program.

If necessary, the HSO will ensure that employees are scheduled and provided specialized training as required. Examples of specified training include (but are not limited to):

- Safe handling/use of flammables, poisons, or toxics
- Confined space entry
- Respirator care/use
- Hazard communication (hazardous chemicals)
- Slip, trip and fall hazards and fall protection
- Blood-borne Pathogens (Non-Medical)

Specialized training will be documented in the employees' personnel records and/or in a master training record.

4.2 Project Team Organization

All personnel who participate in field activities will be required to attend a Health and Safety meeting prior to the commencement of field activities. In addition, the FLS field supervisor will hold daily tailgate safety meetings before the work day begins. These meetings will review the scope of work to be accomplished, any specific safety concerns, address safety questions and issues, and asses the condition of crew and equipment. The tail gate meeting represents the first opportunity to prevent an accident. The meeting will be noted and summarized in the field log.

Health and Safety Officer (HSO)

- Administers all aspects of the occupational health and safety program;
- Develops programs and technical guidance to identify and remove physical, chemical, and biological hazards from facilities, operations, and sites;
- Assists management and supervisors in the health and safety training of employees;
- Conducts inspections to identify unhealthy or unsafe conditions or work practices;
- Investigates all accidents and takes action to eliminate accident causes;
- Monitors to determine the degree of hazard;
- Determines the protection levels and equipment required to ensure the safety of personnel;
- Evaluates on-site conditions (i.e., weather and chemical hazard information) and recommending to the project manager and/or the field coordinator, modifications to the work plan and personnel protection levels;
- Monitors performance of all personnel to ensure compliance with the required safety procedures;
- Ensures that all personnel have been trained in proper site-safety procedures including the use of PPE, and have read and signed the Acknowledgment Form (Attachment I);
- Halts work if necessary;
- Ensures strict adherence to the Site HASP; and
- Reviews personnel medical monitoring participation.

Project Manager

- Familiar with health and safety regulations related to area of responsibility.
- Directs and coordinates health and safety activities within area of responsibility.
- Ensures arrangements for prompt medical attention in case of serious injury
- Requires all employees supervised to use individual protective equipment and safety devices.
- Ensures that safety equipment is available, maintained, used, and stored correctly.
- Instructs and trains all persons within area of responsibility in health and safety requirements.
- Conducts frequent and regular health and safety inspections of work area. Directs correction of unsafe conditions.
- Conducts weekly safety briefings with all supervisors and/or workers.
- Requires all subcontractors and subcontractor personnel to comply with health and safety regulations.

All Employees

The minimum personal qualifications for each individual participating in field activities are:

- OSHA-specific medicals including, but not limited to, audiometric testing under the hearing conservation program and medical approval for the use of respirators;
- Participation in the FLS Occupational Health Monitoring Program;
- Successful completion of the 40-hour OSHA health and safety training for hazardous material sites (29 CFR 1910.120[e][3][i]) and valid/up-to-date 8-hour refresher training (29 CFR 1910.120[e][4]);
- Be familiar with and comply with proper health and safety practices;
- Use the required safety devices and proper personal protective safety equipment; and
- Notify HSO/supervisor immediately of unsafe conditions/acts, accidents, and injuries.

4.3 Subcontractor Compliance

All FLS contracts and subcontracts require that state laws concerning health and safety will be observed by the subcontractor. The provisions of these health and safety responsibilities apply to subcontractors and their employees working for FLS. Failure to fulfill this requirement is a failure to meet the conditions of the contract.

5.0 Individual Health and Safety Programs Listing

OSHA standards specify various individual programs that may be applicable to work performed on eligible sites. Highlights of these programs are provided below, and specific written programs or procedures may be included into this written program, attached, or developed separately, as necessary.

5.1 Hazard Communication Program

If employees are exposed to or work with hazardous chemicals at the job site, this program is required. Required elements of the written program include a master listing of chemicals; maintaining material safety data sheets on each chemical; and training of employees on the program, the chemicals exposed to, and material safety data sheets.

5.2 Respiratory Protection Program

If employees are exposed to hazardous/toxic chemical, paint or other gases, vapors, fumes, dusts, or mists above the National Institute for Occupational Safety and Health (NIOSH) permissible exposure limit (PEL), and/or employees wear respirators, this program is required. Program elements are written program for the selection, maintenance, care, and use of respirators; fit testing, training, and employee evaluation for use.

5.3 Occupational Noise Exposure/Hearing Conservation Program

If employees are exposed to noise levels above the permissible noise exposures, protection against the effects of noise and an effective hearing conservation program are required. Such a program would include elements such as a written program, noise monitoring, hearing evaluations and follow-on testing, personal protective equipment (hearing protection), and maintenance of medical records.

5.4 Emergency Response Plan

If employees are engaged in emergency response to a hazardous substance/chemical release, an emergency response plan must be developed and implemented. Program elements include a written response plan, identification and training of responding employees, medical surveillance and consultation, and post response operations.

5.5 Asbestos Control Program

If employees are exposed to asbestos fibers in the workplace, then an initial monitoring for asbestos exposure must be made. If the monitoring results are above the permissible exposure limit (PEL), this program is required. Program elements include regulated areas, exposure monitoring, medical surveillance and records maintenance, engineering controls, personal protective equipment, and training.

5.6 Lead Exposure Program

If employees are exposed to lead in the workplace, then an initial monitoring for lead exposure must be made. If the monitoring results are above the permissible exposure limit (PEL), this program is required. Program elements include regulated areas, exposure monitoring, medical surveillance and records maintenance, engineering controls, personal protective equipment, and training.

5.7 Dust Suppression Plan

The following techniques have been shown to be effective for the controlling of the generation and migration of dust during excavation activities:

1. Wetting equipment and excavation faces.
2. Spraying water on buckets during excavation and dumping.
3. Hauling materials in properly sealed or watertight containers.
4. Covering excavated areas and material after excavation activity ceases.
5. Reducing the excavation size and/or number of excavations.
6. Applying a dust suppressant, such as calcium chloride.

To evaluate the effectiveness of the dust suppression measures, air-monitoring utilizing real-time dust-monitoring equipment will be performed. The requirements for air monitoring during soil disturbance activities are presented in Section 6.

6.0 Air Monitoring Program

6.1 Air Monitoring Equipment

Air quality monitoring equipment will be used during all work activities to measure total organic vapors and airborne dust concentrations. A PID (to monitor total volatile organic concentrations) will be used during on-site activities. Additionally, particulate monitoring will be performed using a TSI Dust Trak or equivalent. The equipment will be calibrated daily and the results noted in the project field book. A background level will be established, at a minimum, on a daily basis, and recorded in the field book.

6.2 Total Organic Vapor Action Levels

Periodic readings above 5 ppm require caution. A sustained PID measurement greater than 5 ppm or objectionable nuisance odors, detected over a 15-minute period in the breathing zone, will require upgrading to Level C protection. A sustained PID measurement 25 ppm or greater, detected over a 15-minute period in the breathing zone, will require suspension of work activities. The source will be identified and corrective action taken to abate the VOC emissions so that VOC levels are less than 25 ppm.

6.3 Particulate Monitoring Action Levels

During soil excavation, particulate monitoring will be performed using a real-time particulate monitor that will monitor particulate matter less than ten microns (PM10) with the following minimum performance standards:

Object to be measured: Dust, Mists, Aerosols

Size range: <0.1 to 10 microns

Sensitivity: 0.001 mg/m3

Range: 0.001 to 10 mg/m3

Overall Accuracy: ±10% as compared to gravimetric analysis of stearic acid or reference dust.

Particulate levels will be monitored immediately downwind at the working site and integrated over a period not to exceed 15 minutes. The action level will be established at 50 ug/m^3 over the integrated period not to exceed 15 minutes.

7.0 DECONTAMINATION

7.1 Site/Work Area Organization

A typical site work area will consist of an exclusion zone where the actual field activity will take place; a decontamination zone; and a command post located outside the decontamination area and exclusion zones.

Levels of personal protection in the exclusion zone will vary depending on air monitoring data, and will be specified by the HSO.

7.2 Personnel Decontamination

Decontamination (decon) of personnel consists of physically removing soil or contaminants using the correct procedures for washing and removal of PPE. Decon will take place in the designated decontamination zone using the following steps, if applicable:

- Soap and potable water wash and potable water rinse of gloves
- Tyvek removal
- Glove removal
- Field wash of hands and face

7.3 Equipment Decontamination

The following decontamination procedure will be implemented in the field after field equipment has come in contact with contaminated material.

- Rinse equipment in tap water
- Scrub equipment with non-phosphate detergent and tap water
- Rinse equipment with distilled water
- Allow equipment to air dry

8.0 EMERGENCY AND CONTINGENCY PLAN

Emergency communications will be maintained during all on-site field activities. Emergency contacts and their phone numbers are presented in Table 2. Routes to area hospitals appear on Figures 2A and 2B.

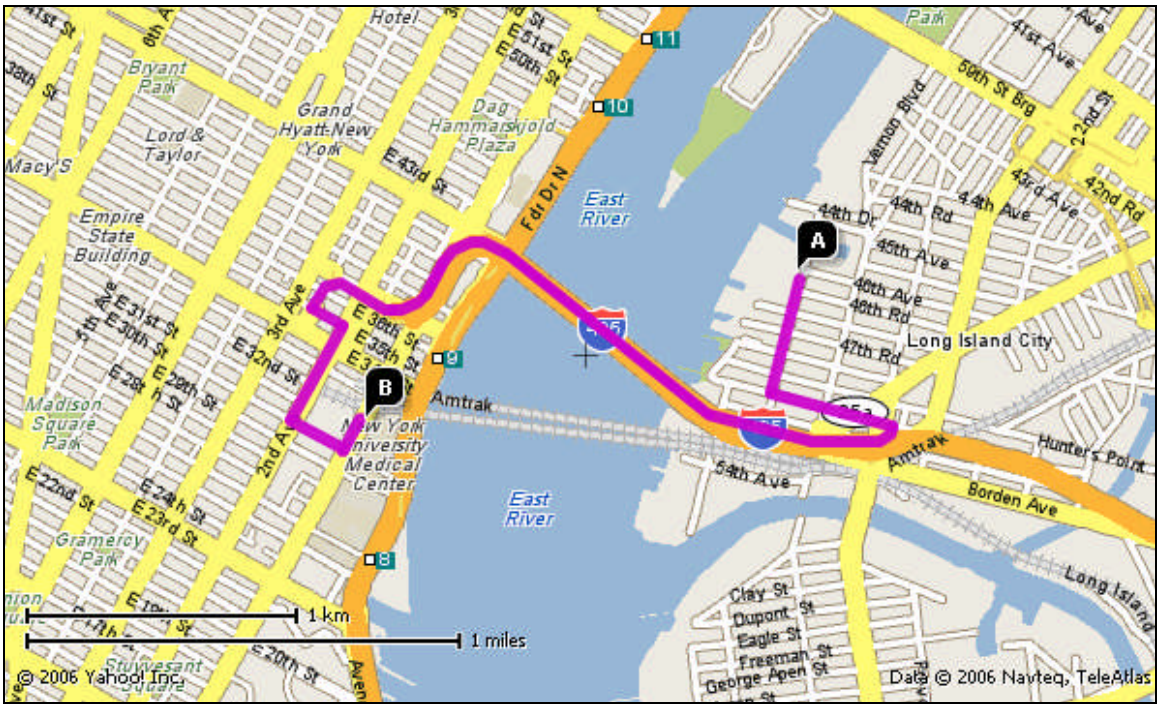
A first aid kit will be available on-site at all times for any minor on-site injuries. Emergency medical assistance or ambulance can be reached by calling 911 for more severe injuries.

Table 2 – Key Personnel Emergency Phone Numbers

New York City Police Department	911
New York City Fire Department	911
New York University Medical Center 550 1st Avenue New York, NY	(212) 263-7300
Mount Sinai of Queens 25-10 30th Avenue Astoria, NY	(718) 932-1000
Emergency Medical Service (ambulance)	911
Steven Panter, FLS Project Manager	(212) 675-3225 ext. 317
Mary Manto, Health and Safety Officer	(212) 675-3225 ext. 302
National Response Center	(800) 424-8802
NYSDEC Spill Hotline	(800) 457-7362

Figure 2A

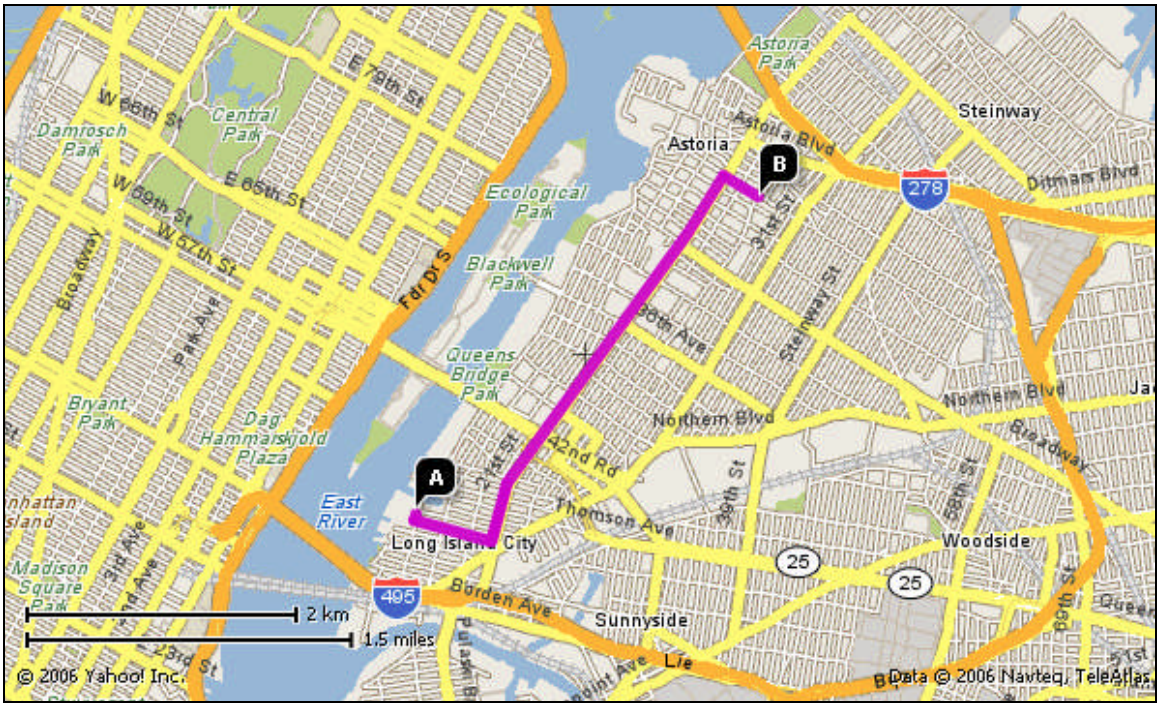
Directions to New York University Medical Center
550 1st Avenue
New York, NY 10016
(212) 263-7300



Driving Directions:	**Distance (miles)**
Begin at 46-00 5th Street going towards 46th Avenue	0.3
Turn left onto 50th Avenue	0.3
Turn right to take I-495 West towards Queens Midtown Tunnel	1.4
Take Tunnel Exit Street towards downtown	0.2
Ramp becomes Tunnel Exit Street	0.1
Continue on Queens Midtown Tunnel Exit/Tunnel Exit	0.1
Turn left onto East 34th Street	0.1
Turn right onto 2nd Avenue	0.2
Turn left onto East 30th Street	0.1
Turn left onto 1st Avenue	0.1
Arrive at 550 1st Avenue, New York	

Figure 2B

Directions to Mount Sinai of Queens
25-10 30th Avenue
Astoria, NY 11102
(718) 932-1000



Driving Directions:	**Distance (miles)**
Start on 5th Street and 47th Avenue	0.1
Turn right onto 46th Road	0.4
Turn left onto 21st Street	2.1
Turn right onto 29th Avenue	0.2
Turn right onto 25th Street/Crescent Street	0.1
Arrive at 25-10 30th Avenue, Astoria	

ATTACHMENT I

Acknowledgment Form

HASP ACKNOWLEDGMENT FORM

The following personnel have read the site-specific HASP and are familiar with its provisions.

Print Name	*Signature*	*Company*	*Function*	*Date*

ATTACHMENT II

Profiles of Chemicals of Concern/
Material Safety Data Sheets

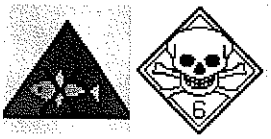
International Chemical Safety Cards

ARSENIC

ICSC: 0013

Grey arsenic
As
Atomic mass: 74.9

ICSC # 0013
CAS # 7440-38-2
RTECS # CG0525000
UN # 1558
EC # 033-001-00-X



TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible. Gives off irritating or toxic fumes (or gases) in a fire.	NO open flames. NO contact with strong oxidizers. NO contact with hot surfaces.	Powder, water spray, foam, carbon dioxide.
EXPLOSION	Risk of fire and explosion is slight when exposed to hot surfaces or flames in the form of fine powder or dust.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST! AVOID ALL CONTACT! AVOID EXPOSURE OF (PREGNANT) WOMEN!	IN ALL CASES CONSULT A DOCTOR!
•INHALATION	Cough. Sore throat. Shortness of breath. Weakness. (See Ingestion).	Closed system and ventilation.	Fresh air, rest. Artificial respiration if indicated. Refer for medical attention.
•SKIN	Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse skin with plenty of water or shower.
•EYES	Redness.	Face shield, or eye protection in combination with breathing protection if powder.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Diarrhoea. Nausea. Vomiting. Burning sensation in the throat and	Do not eat, drink, or smoke during work. Wash hands before eating.	Rinse mouth. Induce vomiting (ONLY IN CONSCIOUS PERSONS!). Refer for

	chest. Shock or collapse. Unconsciousness.	medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Evacuate danger area! Sweep spilled substance into sealable containers. Carefully collect remainder, then remove to safe place. Chemical protection suit including self-contained breathing apparatus. Do NOT let this chemical enter the environment.	Separated from strong oxidants, acids, halogens, food and feedstuffs. Well closed.	Do not transport with food and feedstuffs. Marine pollutant. T symbol R: 23/25 S: 1/2-20/21-28-45 UN Hazard Class: 6.1 UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0013

International Chemical Safety Cards

ARSENIC

ICSC: 0013

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
ODOURLESS, BRITTLE, GREY, METALLIC-LOOKING CRYSTALS.

PHYSICAL DANGERS:

CHEMICAL DANGERS:
Upon heating, toxic fumes are formed. Reacts violently with strong oxidants halogens, causing fire and explosion hazard. Reacts with acids to produce

OCCUPATIONAL EXPOSURE LIMITS:
TLV: ppm; 0.01 mg/m^3 (as TWA) A1 (ACGIH 1999).
NIOSH REL: Ca C 0.002 mg/m^3 15-minute See Appendix A
NIOSH IDLH: Potential occupational carcinogen 5 mg/m^3 (as As)

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly, when dispersed.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance irritates the eyes the skin the respiratory tract. The substance may cause effects on the gastrointestinal tract cardiovascular system central nervous system kidneys resulting in severe gastroenteritis, loss of fluid, and electrolytes, cardiac disorders shock convulsions kidney impairment Exposure above OEL may result in death. The effects may be delayed. Medical observation is indicated.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:

		Repeated or prolonged contact with skin may cause dermatitis. Repeated or prolonged contact may cause skin sensitization. The substance may have effects on the mucous membranes, skin, peripheral nervous system liver bone marrow, resulting in pigmentation disorders, hyperkeratosis, perforation of nasal septum, neuropathy, liver impairment anaemia This substance is carcinogenic to humans. Animal tests show that this substance possibly causes malformations in human babies.
PHYSICAL PROPERTIES	Sublimation point: 613°C Density: 5.7 g/cm^3	Solubility in water: none
ENVIRONMENTAL DATA	The substance is toxic to aquatic organisms. It is strongly advised not to let the chemical enter into the environment because it persists in the environment.	

NOTES

The substance is combustible but no flash point is available in literature. Depending on the degree of exposure, periodic medical examination is indicated. Do NOT take working clothes home. Refer also to cards for specific arsenic compounds, e.g., Arsenic pentoxide (ICSC # 0377), Arsenic trichloride (ICSC # 0221), Arsenic trioxide (ICSC # 0378), Arsine (ICSC # 0222).

Transport Emergency Card: TEC (R)-61G64b

ADDITIONAL INFORMATION

ICSC: 0013 **ARSENIC**

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

Contaminant	Recognized and Suspected Health Hazards
Volatile Organic Compounds (VOCs), Including BTEX Benzene, Toulene, Ethylbenzene and Xylene	**Suspected** carcinogen; cardiovascular or blood toxicant; gastrointestinal or liver toxicant; reproductive toxicant; respiratory toxicant; skin or sense organ toxicant
Styrene	**Suspected** carcinogen; gastrointestinal or liver toxicant; kidney toxicant; neurotoxicant; respiratory toxicant; skin or sense organ toxicant
Cis 1,2-Dichloroethene	**Suspected** cardiovascular or blood toxicant; neurotoxicant
MTBE	**Suspected** carcinogen; gastrointestinal or liver toxicant; kidney toxicant; neurotoxicant; respiratory toxicant; skin or sense organ toxicant
Naphthalene	**Suspected** carcinogen; gastrointestinal or liver toxicant; kidney toxicant; neurotoxicant; respiratory toxicant; skin or sense organ toxicant
PAHs	**Suspected** carcinogen; cardiovascular or blood toxicant; gastrointestinal or liver toxicant; reproductive toxicant; respiratory toxicant; skin or sense organ toxicant
Creosote	**Recognized** carcinogen **Suspected** gastrointestinal; reproductive toxicant; respiratory toxicant; skin or sense organ toxicant
Dieldrin	**Recognized** carcinogen **Suspected** cardiovascular or blood toxicant; endocrine toxicant; gastrointestinal or liver toxicant; immunotoxicant; kidney toxicant; neurotoxicant; reproductive toxicant; respiratory toxicant
Methoxychlor	**Suspected** developmental toxicant; endocrine toxicant; gastrointestinal or liver toxicant; kidney toxicant; neurotoxicant; reproductive toxicant; respiratory toxicant; skin or sense organ toxicant
Heptachlor Epoxide	**Recognized** carcinogen **Suspected** endocrine toxicant
PCBs (Arochlor)	**Recognized** carcinogen, developmental toxicant **Suspected** endocrine toxicant; gastrointestinal or liver toxicant; immunotoxicant; neurotoxicant; reproductive toxicant; respiratory toxicant; skin or sense organ toxicant
Arsenic	**Recognized** carcinogen; developmental toxicant

Contaminant	Recognized and Suspected Health Hazards
	Suspected cardiovascular or blood toxicant; endocrine toxicant; gastrointestinal or liver toxicant; immunotoxicant; kidney toxicant; neurotoxicant; reproductive toxicant; respiratory toxicant; skin or sense organ toxicant
Barium	**Suspected** developmental toxicant; neurotoxicant; reproductive toxicant; respiratory toxicant;
Copper	**Suspected** cardiovascular or blood toxicant; developmental toxicant; gastrointestinal or liver toxicant; kidney toxicant; reproductive toxicant; respiratory toxicant
Iron	**Suspected** cardiovascular or blood toxicant; gastrointestinal or liver toxicant; kidney toxicant; neurotoxicant; reproductive toxicant; respiratory toxicant;
Chromium	**Suspected** carcinogen; gastrointestinal or liver toxicant; kidney toxicant; neurotoxicant; respiratory toxicant
Lead	**Recognized** carcinogen; developmental toxicant; reproductive toxicant **Suspected** cardiovascular or blood toxicant; endocrine toxicant; gastrointestinal or liver toxicant; immunotoxicant; kidney toxicant; neurotoxicant; respiratory toxicant; skin or sense organ toxicant
Mercury	**Recognized** developmental toxicant **Suspected** cardiovascular or blood toxicant; endocrine toxicant; gastrointestinal or liver toxicant; immunotoxicant; kidney toxicant; neurotoxicant; reproductive toxicant; respiratory toxicant; skin or sense organ toxicant
Nickel	**Recognized** carcinogen **Suspected** cardiovascular and blood toxicant; developmental toxicant; immunotoxicant; kidney toxicant; neurotoxicant; reproductive toxicant; respiratory toxicant; skin or sense organ toxicant
Zinc	**Suspected** cardiovascular or blood toxicant; developmental toxicant; immunotoxicant; reproductive toxicant; respiratory toxicant; skin or sense organ toxicant
Sodium Peroxide	**Recognized** corrosive; skin and eye toxicant
Sodium Persulfate	**Recognized** corrosive; skin and eye toxicant

International Chemical Safety Cards

BENZENE

ICSC: 0015

Cyclohexatriene
Benzol
C_6H_6
Molecular mass: 78.1

ICSC # 0015
CAS # 71-43-2
RTECS # CY1400000
UN # 1114
EC # 601-020-00-8

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Highly flammable.	NO open flames, NO sparks, and NO smoking.	Powder, AFFF, foam, carbon dioxide.
EXPLOSION	Vapour/air mixtures are explosive. Risk of fire and explosion: see chemical dangers.	Closed system, ventilation, explosion-proof electrical equipment and lighting. Do NOT use compressed air for filling, discharging, or handling. Use non-sparking handtools.	In case of fire: keep drums, etc., cool by spraying with water.
EXPOSURE		AVOID ALL CONTACT!	
•INHALATION	Dizziness. Drowsiness. Headache. Nausea. Shortness of breath. Convulsions. Unconsciousness.	Ventilation, local exhaust, or breathing protection.	Fresh air, rest. Refer for medical attention.
•SKIN	MAY BE ABSORBED! Dry skin (further see Inhalation).	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.
•EYES		face shield, or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Abdominal pain. Sore throat. Vomiting (further see Inhalation).	Do not eat, drink, or smoke during work.	Rinse mouth. Do NOT induce vomiting. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Collect leaking and spilled liquid in sealable containers as far as possible. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT wash away into sewer (extra personal protection: complete protective clothing including self-contained breathing apparatus).	Fireproof. Separated from food and feedstuffs, oxidants and halogens.	Do not transport with food and feedstuffs. F symbol T symbol R: 45-11-48/23/24/25 S: 53-45 UN Hazard Class: 3 UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0015

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 1999. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

BENZENE

ICSC: 0015

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
COLOURLESS LIQUID , WITH CHARACTERISTIC ODOUR.

PHYSICAL DANGERS:
The vapour is heavier than air and may travel along the ground; distant ignition possible.

CHEMICAL DANGERS:
Reacts violently with oxidants and halogens causing fire and explosion hazard.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: 10 ppm; 32 mg/m^3 (as TWA) A2 (ACGIH 1991-1992).
OSHA PEL: 1910.1028 TWA 1 ppm ST 5 ppm See Appendix F
NIOSH REL: Ca TWA 0.1 ppm ST 1 ppm See Appendix A
NIOSH IDLH: Potential occupational carcinogen 500 ppm

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation and through the skin.

INHALATION RISK:
A harmful contamination of the air can be reached rather quickly on evaporation of this substance at 20°C; on spraying or dispersion, however, much faster.

EFFECTS OF SHORT-TERM EXPOSURE:
The substance irritates the skin and the respiratory tract. Swallowing the liquid may cause aspiration into the lungs with the risk of chemical pneumonitis. The substance may cause effects on the central nervous system. Exposure far above the occupational exposure limit may result in unconsciousness.

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
The liquid defats the skin. The substance may have effects on the blood forming organs, liver and immune system. This substance is carcinogenic to humans.

PHYSICAL PROPERTIES	Boiling point: 80°C Melting point: 6°C Relative density (water = 1): 0.9 Solubility in water, g/100 ml at 25°C: 0.18 Vapour pressure, kPa at 20°C: 10 Relative vapour density (air = 1): 2.7	Relative density of the vapour/air-mixture at 20°C (air = 1): 1.2 Flash point: (c.c.) -11°C Auto-ignition temperature: about 500°C Explosive limits, vol% in air: 1.2-8.0 Octanol/water partition coefficient as log Pow: 2.13
ENVIRONMENTAL DATA		

N O T E S

Use of alcoholic beverages enhances the harmful effect. Depending on the degree of exposure, periodic medical examination is indicated. The odour warning when the exposure limit value is exceeded is insufficient.

Transport Emergency Card: TEC (R)-7
NFPA Code: H2; F3; R0;

ADDITIONAL INFORMATION

ICSC: 0015 **BENZENE**

International Chemical Safety Cards

CHROMIUM

ICSC: 0029

Chrome
Cr (metal)
Atomic mass: 52.0

ICSC # 0029
CAS # 7440-47-3
RTECS # GB4200000

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Combustible if in very fine powder. Gives off irritating or toxic fumes (or gases) in a fire.	No open flames if in powder form.	In case of fire in the surroundings: all extinguishing agents allowed.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE!	
•INHALATION	Cough.	Local exhaust or breathing protection.	Fresh air, rest.
•SKIN	Redness.	Protective gloves.	Remove contaminated clothes. Rinse skin with plenty of water or shower. Refer for medical attention.
•EYES	Redness.	Face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION		Do not eat, drink, or smoke during work.	Rinse mouth.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Vacuum spilled material. Carefully collect remainder, then remove to safe place (extra personal protection: P2 filter respirator for harmful	Fireproof. Separated from strong oxidants.	R: S:

particles).

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0029

International Chemical Safety Cards

CHROMIUM

ICSC: 0029

I M P O R T A N T D A T A

PHYSICAL STATE; APPEARANCE:
STEEL GREY LUTROUS METAL.

PHYSICAL DANGERS:
Dust explosion possible if in powder or granular form, mixed with air.

CHEMICAL DANGERS:
Reacts violently with strong oxidants such as hydrogen peroxide, causing fire and explosion hazard. Reacts with diluted hydrochloric and sulfuric acids. Incompatible with alkalis and alkali carbonates.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: ppm; 0.5 mg/m^3 (as TWA) (ACGIH 1994-1995).
OSHA PEL*: TWA 1 mg/m^3 See Appendix C *Note: The PEL also applies to insoluble chromium salts.
NIOSH REL: TWA 0.5 mg/m^3 See Appendix C
NIOSH IDLH: 250 mg/m^3 (as Cr)

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its aerosol and by ingestion.

INHALATION RISK:
Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed.

EFFECTS OF SHORT-TERM EXPOSURE:

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact may cause skin sensitization.

PHYSICAL PROPERTIES

Boiling point: 2642°C
Melting point: 1900°C
Relative density (water = 1): 7.14
Solubility in water: none

ENVIRONMENTAL DATA

N O T E S

Explosive limits are unknown in literature. Depending on the degree of exposure, periodic medical examination is indicated.

ADDITIONAL INFORMATION

ICSC: 0029	**CHROMIUM**

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

METAL

6 M

noranda

COPPER METAL

WHMIS (Classification)
Not controlled (Canada)

WHMIS (Pictograms)

SECTION 1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

Trade Name	**Copper metal**
Product Code	Not available
Supplier	FALCONBRIDGE LIMITED, Kidd Metallurgical Division P.O. Bag 2002 Timmins, Ontario, Canada, P4N 7K1
Information Contact	Tony Fontana
Phone Number (Business hours)	(705) 235-8121
Phone Number (Emergency)	**(705) 235-8121**
Synonyms	Cathode Copper Cathode de cuivre ; cuivre métallique (French)
DSL (Domestic Substance List)	Listed
Name / Chemical Formula	Copper / Cu
Chemical Family	Metal
Utilization	Copper wire ; Copper piping ; Alloying (Bronze, brass)

SECTION 2. COMPOSITION AND INFORMATIONS ON INGREDIENTS

			Exposure Limits		
			ACGIH (U.S.A.)	OSHA (U.S.A.)	ONTARIO (CA)
Name	**CAS #**	**Percentage (%)**	**TLV-TWA (mg/m³)**	**PEL - TWA (mg/m³)**	**TWAEV (mg/m³)**
Copper	7440-50-8	99.99	1 (dust, mist) 0.2 (fume)	1 (dust, mist) 0.1 (fume)	1 (dust, mist) 0.2 (fume)

ACGIH : American Conference of Governmental Industrial Hygienists. OSHA : Occupational Safety and Health Administration. QUEBEC : Règlement sur la qualité du milieu de travail

Note : **Copper :** NIOSH REL (≤10 hour workday ; 40-hour workweek) : 1 mg/m³ (Copper and copper compounds, as Cu, except fume) ; IDLH : 100 mg/m³. ORAL acute (LD50) : 1 000 mg/kg (Rat) ; INTRAPERITONAL (LD 50) : 3.5 mg/kg (Mouse).

Consult local authorities for acceptable exposure limits

SECTION 3. PHYSICAL AND CHEMICAL PROPERTIES

Physical State and Appearance	Solid	**Odour**	Odourless
Molecular Weight	63.546	**Taste**	Metallic
pH (1% soln/water)	Not applicable	**Colour**	Reddish
Boiling Point	2 324°C (4 215.2°F)	**Volatility**	Not available
Melting Point	1 083°C (1 981.4°F)	**% Moisture**	Not applicable
Critical Temperature	Not available	**Odour Threshold**	Not available
Specific Gravity	8.92 (Water = 1)	**Water/Oil Dist. Coeff.**	Not available
Vapour Pressure	Not available	**Ionicity (in Water)**	Not available
Vapour Density	Not available	**Dispersion**	Not available
Solubility	No (Water)		

SECTION 4. RISK IDENTIFICATION FOR HUMAN HEALTH

Routes of Entry	Ingestion. Inhalation.
Carcinogenicity	**Copper** : NOT CLASSIFIED.
Mutagenicity	Not applicable.
Tératogenicity	Not applicable.
Acute Effects	Plate form : No health hazards. Conditions and work practices which generate dust or fume should be avoided or controlled. Dust and fume can cause health effects.
Chronic Effects	No known effects from chronic exposure. **Copper :** Essential for human health. Exposure to fumes or extremely fine dusts (Concentrations of 0.075 to 0.12 mg/m³) may cause **metal fume fever**, a delayed, generally benign, transient, reversible flu-like condition. Target organs for acute and chronic overexposure (NIOSH 90-117) : Respiratory system, skin, liver and kidneys.
Toxicity	Persons with the following pre-existing conditions warrant particular attention : **Copper :** Wilson's disease. *Eating, drinking and smoking must be prohibited in areas where this material is handled and processed. Wash hands and face before eating, drinking and smoking.*

SECTION 5. FIRST AID MEASURES

Eye Contact	Remove contact lenses if present. Immediately rinse eyes with plenty of water, while holding eyelids open for at least 20 minutes. Consult a physician.
Skin Contact	Wash skin with water and soap.
Inhalation	Remove the person from exposure. Bring to fresh air. Difficult breathing : give oxygen. Get **immediate** medical attention.

Ingestion	Rare in industry. Induce vomiting. **UNCONSCIOUS** person : **DO NOT** induce vomiting or give any liquid. **Immediately** obtain medical attention.

SECTION 6. FIRE AND EXPLOSION DATA

Flash Point	Not applicable
Flammable Limits	Not applicable
Auto-Ignition Temperature	Not applicable
Products of Combustion	Copper oxides.
Fire Hazard	Dusts : flammable when exposed to heat or flames.
Explosion Hazard	Not explosive (Mechanical impact ; Static discharge) **Copper (Liquid) :** Explodes on contact with water. Some chemical forms may explode with : Acetylene compounds, ammonium nitrate, 3-bromopropyne, ethylene oxide, lead azide.
Fire Fighting (Instructions)	NON-FLAMMABLE. Use fire fighting materials and procedures adapted to the immediate environment. Firefighters must wear full protective clothing and self-contained breathing apparatus (SCBA).

SECTION 7. HANDLING AND STORAGE / ENGINEERING CONTROLS AND PERSONAL PROTECTION

Handling	**DO NOT** ingest or inhale dusts. Wear adequate protective clothing. Wear approved respirators if adequate ventilation cannot be provided. Ingestion or inhalation : Seek medical advice immediately and provide medical personnel with a copy of this MSDS.
Storage	Away from : Moisture, incompatible (Acids) and oxidizing substances.
Engineering Controls	Use process enclosures, local exhaust ventilation or other engineering controls to keep airborne levels below recommended exposure limits.
Personal Protection	Safety glasses. Coveralls. Work gloves and boots. Dust respirator. Be sure to use a NIOSH approved respirator or equivalent when concentrations exceed occupational exposure limits.

SECTION 8. ACCIDENTAL RELEASE MEASURES / DISPOSAL ARRANGEMENTS

Spill	Recover, return to process. Wash down with water if in contact with acids.
Personal Protection	High concentrations of fumes or dusts : Use a self-contained breathing apparatus (SCBA) to avoid inhalation of material. Low concentrations : Use a NIOSH/OSHA approved full face cartridge respirator or the equivalent. Full protective clothing. Boots. Gloves.
Waste Disposal	Recycle to process, if possible. Consult local or regional authorities.

SECTION 9. STABILITY AND REACTIVITY DATA

Stability	Yes
Conditions of Instability	Not applicable
Incompatibilities	Reactive with : acids **Copper :** Violent reactions with : Bromates, chlorates, hydrogen peroxide, sulfuric acid, sodium peroxide, dipotassium peroxide, hydrazoic acid, combination of hydrogen sulfur and air.
Corrosivity	No

SECTION 10. ECOTOXICOLOGICAL INFORMATION

Ecotoxicity	Not available
Toxicity to Animals	**Copper :** INTRAPERITONEAL (LD50) : 3.5 mg/kg (Mouse).
Biodegradation Products	Not biodegradable
Biodegradation Products (Toxicity)	Not applicable
Remarks on Environment	No additional remarks
BOD5 and COD	Not available

SECTION 11. TRANSPORT INFORMATION / OTHER REGULATIONS

TDG (Pictograms)	Not regulated (Canada)
PIN	Not applicable
Special Provisions (Transport)	Not applicable
Other Regulations	EU (Existing Substances Annex I - Regulation (EC) 793/93) : listed. **Copper :** EU Consolidated Inventories : EC Number 2311596 CANADIAN ENVIRONMENTAL PROTECTION ACT (CEPA) : on the Domestic Substances List (DSL) ; acceptable for use under the provisions of CEPA.

CERCLA Section 103 Hazardous substances (40 CFR 302.4) ; SARA 110 ATSDR CERCLA Priority List : listed. SARA Section 313, Toxic Chemicals (40 CFR 372.65) :
Copper (Final RQ) : *5 000 pounds (2 270 kg)

US EPA TSCA Chemical Inventory : Listed.
Copper

* No declaration required if the diameter of the piece of solid metal released is equal to or exceeds 100 micrometers (0.004 inches).

Classifications HCS (U.S.A.) Not regulated
Classifications DSCL (EEC) Not regulated

NFPA (National Fire Protection Association) (U.S.A.)

Fire Hazard	0	Health	1	Special Hazard	

DOT (U.S.A.) (Pictograms) **DSCL (Europe) (Pictograms)** **ADR (Europe) (Pictograms)**

SECTION 12. OTHER INFORMATION

References
- ACGIH, TLVs and BEIs. 2002
- Canadian Centre for Occupational Health and Safety (CCOHS). Database MSDS/FTSS. Network Version WWW, 2003
- CSST - Répertoire toxicologique, 2003
- IARC, Monographs on the Evaluation of Carcinogenic Risks to Humans (collection)
- Merck Index. Merck & CO., Inc, 12th edition, 1999
- NIOSH U.S.- Pocket Guide to Chemical Hazards - WWW database, 2003
- North American Emergency Response Guidebook Documents, Developed by the U.S. Department of Transportation, Transport Canada, and the Secretariat of Communications and Transportation of Mexico. 2000
- Patty's Industrial Hygiene and Toxicology, 3rd Revised Edition
- Règlement sur les produits contrôlés (Canada)
- TOMES plus® by Micromedex inc. Environmental Health & Safety Series. WWW database, 2003
- Toxicologie Industrielle & Intoxication Professionnelle, 3e édition, Lauwerys

Glossary
CSST : Commission de la Santé et de la Sécurité du Travail (Québec).
IARC : International Agency for Research on Cancer.
NIOSH : National Institute of Occupational Safety and Health.
NTP : U.S. National Toxicology Program.

Written by : Groupe STEM Consultants / Noranda inc. **Date :** 2003-05-16 **Previous Date :** 2000-05-16

SECTION 13. MSDS REQUEST

Request Gina Daniel Tél. : (416) 982-7041 Fax : (416) 982-3514
NORANDA INC. Queen's Quay Terminal, 207 Queen's Quay West, Suite 800, Toronto (Ontario), Canada M5J 1A7

Material Safety Data Sheet

CREOSOTE

1. CHEMICAL PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME:	CREOSOTE
OTHER/GENERIC NAMES:	Coal Tar Creosote, KMG-B Coal Tar Creosote Creosote Oil
PRODUCT USE:	Wood preservative
COMPANY:	KMG-Bernuth, Inc. 10611 Harwin, Suite 402 Houston, Texas 77036 Telephone: 713-988-9252
U. S. EPA Registration Nos.	61470-1 61483-7, 61483-8 61483-9, 61483-10

IN CASE OF EMERGENCY CALL:
(24 Hours/Day, 7 Days/Week)

CHEMTREC: 1 800 424 9300

2. COMPOSITION/INFORMATION ON INGREDIENTS

INGREDIENT NAME	CAS NUMBER	WEIGHT %
Creosote *	8001-58-9	100

* Mixture of 2, 3, & 4-ringed polynuclear aromatic hydrocarbons, including some substituted compounds

Trace impurities and additional material names not fisted above may also appear in Section 15. These materials may be listed for local “Right-To-Know" compliance and for other reasons.

3. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW: Creosote is a brown to black oily liquid with a penetrating smoky odor. Vapor causes moderate to severe irritation of eyes, nose, throat and respiratory tract. Liquid can cause burning and itching with reddening of the skin, which is accentuated by sunlight.

POTENTIAL-HEALTH HAZARDS

SKIN: Contact with skin can result in irritation, which when not washed off or when accentuated by sunlight, can result in minor burns.

EYES: Overexposure to product vapors can result in irritation. Eye contact with product will result in irritation, which in the absence of recommended first aid can result in effects ranging from minor burns to severe corneal injury, including keratitis, conjunctivitis and corneal abrasion.

INHALATION: Overexposure to vapor may result in irritation to respiratory tract. Prolonged exposure in significant excess of permissible air concentrations can result in acute toxic effects, such as dizziness, respiratory difficulty, convulsions and possible cardiovascular collapse.

INGESTION: Irritation of the gastrointestinal tract followed by nausea and vomiting, abdominal discomfort. rapid pulse etc. Cardiovascular collapse may occur.

DELAYED EFFECTS: Prolonged and repeated skin exposure over many years in the absence of recommended hygiene practices may lead to changes in skin pigmentation, benign skin growths and may, in some cases, result in skin cancer. Additionally, inhalation may present a lung cancer hazard.

Ingredients found on one of the OSHA designated carcinogen lists me listed below.

INGREDIENT NAME	NTB STATUS	JARC STATUS	OSHA LIST
Creosote	Carcinogen	2A - Probable	–

4. FIRST AID MEASURES

SKIN: Wash thoroughly with waterless hand cleaners, olive oil or soap and water. Avoid solvents.

EYES: Flush eyes immediately with large amounts of water or olive oil for at least 15 minutes. Call a physician

INHALATION: Remove to fresh air. If not breathing, give artificial respiration; preferably mouth-to-mouth. If breathing is difficult, give oxygen. Call a physician.

INGESTION: If conscious. first induce vomiting, then take 2 tablespoons of activated charcoal (USP-drug grade) in water. Get immediate medical attention. Do not induce vomiting, or give anything by mouth to an unconscious person.

ADVICE TO PHYSICIAN: No additional instructions.

5. FIREFIGHTING MEASURES

FLAMMABLE PROPERTIES

FLASH POINTS:	> 93º C (> 200º F) / > 93º C (> 200º F)
FLASH POINT METHOD:	Closed Cup / Open Cup
AUTOIGNITION TEMPERATURE:	336º C (637º F)
UPPER FLAME LIMIT (volume 0/6 in air):	Not Determined
LOWER FLAME LIMIT (volume % In air):	Not Determined
FLAME PROPAGATION RATE (solids):	Not Applicable
OSHA FLAMMABILITY CLASS:	Not Determined

EXTINGUISHING MEDIA: Water/fog, carbon dioxide, foam, dry chemicals, sand or steam.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Water/fog is recommended for the control of unconfined oil fires, but water may cause frothing or eruption in closed tank.

SPECIAL FIRE FIGHTING PRECAUTIONS/INSTRUCTIONS: Self-contained breathing apparatus (SCBA) and full protective clothing should be worn when fumes and/or smoke are present.

6. ACCIDENTAL RELEASE MEASURES

IN CASE OF SPILL OR OTHER RELEASE: (Always wear recommended personal protective equipment)

Avoid breathing vapors and contact with skin and eyes. Avoid sources of ignition (sparks or open flame). Contain the spill or leak with solids, such as sand, earth, etc. Contaminated materials must be handled and managed as RCRA Hazardous Waste and treated before disposal in approved facilities. Do not allow to enter into sewers or waterways.

Spills and releases may have to be reported to Federal and/or local authorities. See Section 15.

7. HANDLING AND STORAGE

NORMAL HANDLING: (Always wear recommended personal protective equipment)

Wear clothing closed at the neck, long sleeves and non-porous type gloves, eg. neoprene, butyl rubber, nitrile, poly-vinyl alcohol (PVA), polyvinyl chloride (PVC).

STORAGE RECOMMENDATIONS: Recommended temperature for storage is about 140º F.

8. EXPOSURE CONTROLS/PERSONAL PROTECTION

ENGINEERING CONTROLS: Use in areas with adequate natural or local exhaust ventilation.

PERSONAL PROTECTIVE EQUIPMENT

SKIN PROTECTION:	Avoid skin contact whenever possible by using non-porous type gloves. For outdoor work use a waterproof sunscreen (SPF 25 or greater); reapply every 90 minutes while in direct sun. For exposed skin, use protective creams (for example: MSA's Fend AE-2, Kerodex 51, Jergens SBS-46).
EYE PROTECTION:	Safety glasses, goggles and/or face shield.
RESPIRATORY PROTECTION:	Not required for properly ventilated areas. Use a NIOSH approved respirator with suitable organic vapor cartridge as necessary to control exposures above the TLV of PEL.
ADDITIONAL RECOMMENDATIONS:	Do not take contaminated work clothing home. It is recommended that a complete soap and water shower and/or steam bath be taken at the end of each working day.

EXPOSURE GUIDELINES

INGREDIENT NAME	ACGIH TLV	OSHA PEL	OTHER LIMIT
Creosote (measured as Coal Tar Pitch Volatiles, CTPV	0.2 mg/m^3	0.2 mg/ m^3	–

HAZARDOUS INGREDIENTS	CAS NUMBER	% BY WT.	EXPOSURE LIMIT	(PPM; MG/M3)
Coal Tar Distillate	65996-92-1		OSHA-TWA -	*
Indene	95-13-6	<10	ACGIH-TWA 10	48
			OSHA-TWA 10	45
Naphthalene	91-20-3	<15	ACGIH-TWA 10	52
			ACGIH-STEL 15	79
			OSHA-TWA 10	50
			OSHA-STEL 15	75
			NIOSH-TWA 10	50
			NIOSH-STEL 15	75
Biphenyl	92-52-4	<5	ACGIH-TWA 0.2	1.3
			OSHA-TWA 0.2	1
Benzene	71-43-2	<1	ACGIH-TWA 10	32**, #
			OSHA-TWA 1	***
			OSHA-STEL 5	-
			NIOSH-TWA 0.1	-
			NIOSH-STEL 1	-
Alkylnaphthalene		<10	none	
Phenanthrene	85-01-8	9-13	NONE	
Benz (a) anthracene	56-55-3	1.6	NONE	
Benzo (a) phenanthrene	218-01-9	1.7	NONE	
Benzo (b) fluoranthene+	205-99-2		NONE	
Benzo (k) fluoranthene+	207-08-9		NONE	
Benzo (j) fluoranthene+	205-82-3		NONE	
7, 12-Dimethylbenz (a) anthracene	57-97-6	2.43	NONE	
Indeno (1,2,3-cd) pyrene	193-39-5	0.25	NONE	
Benzo (a) pyrene	50-32-8	0.92	NONE	
Dibenzo (a,h) anthracene	53-70-3	0.09	NONE	
Benzo (g,h,i) perylene+	191-24-2		NONE	
7-H Dibenzo (c,g) carbazole	194-59-2	0.18	NONE	
Dibenzo (a,l) pyrene	191-30-0	0.02	NONE	
1-Nitropyrene	5522-43-0	0.24	NONE	
Dibenz (a,j) acridine	224-42-0	0.06	NONE	
Dibenz (a,h) acridine	226-36-8	0.04	NONE	

------SARA TITLE III SECTION 313 CHEMICALS------
(SEE SECTION V11 FOR CAS NUMBERS AND PERCENTAGES)

Naphthalene
Biphenyl
Benzene
Phenanthrene / Benz (a) anthracene
Benzo (a) phenanthrene
Benzo (b) fluoranthrene / Benzo (k) fluoranthrene
Benzo (j) fluoranthrene
Benzo (a) pyrene
Dibenzo (a,h) anthracene
Indeno)1,2,3-cd) pyrene
1-Nitropyrene
7,12-Dimethylbenz (a) anthracene
7-H Dibenzo (c,g) carbazole / Benzo (g,h,i) perylene
Dibenzo (a,l) pyrene
Dibenz (a,j) acridine
Dibenz (a,h) acridine

OTHER EXPOSURE LIMITS FOR POTENTIAL DECOMPOSITION PRODUCTS: None

9. PHYSICAL AND CHEMICAL PROPERTIES

APPEARANCE:	Dark brown to black oily liquid
PHYSICAL STATE:	Liquid
MOLECULAR WEIGHT:	130-210
CHEMICAL FORMULA:	Mixture of organic compounds
ODOR:	Penetrating smoky odor
SPECIFIC GRAVITY (water=1.0):	1.03-1.18 (Avg.: 9.1 lbs/ gal)
SOLUBILITY IN WATER (weight %):	Insoluble
pH:	Not Determined
BOILING POINT:	194 - 400º C
MELTING POINT:	Not Determined
VAPOR PRESSURE (in mm Hg):	at 100º C - 80 mm; at 125º C - 225 mm; at 150º C - 370 mm
VAPOR DENSITY (air = 1.0):	< 1
EVAPORATION RATE:	< 1 COMPARED TO: Butyl Acetate –1
% VOLATILES:	Not Determined
FLASH POINT:	Closed cup: > 93º C (>200º F)
	Open cup: > 93º C (>200º F)

(Flash point method and additional flammability data are found in Section 5.)

10. STABILITY AND REACTIVITY

STABILITY (CONDITIONS TO AVOID): Product stable under normal conditions.
Due to its low vapor pressure and extremely low evaporation rate, the volatility rate at 20º C is almost zero. Upon heating, at extremely high temperatures, hydrocarbons will be emitted and some degradation will take place. Avoid loading or unloading near open flame.

INCOMPATIBILITIES: Mixing chlorosulfonic acid and creosote oil in a closed container can cause an increase in temperature and pressure (NFPA 491M, 1991)

HAZARDOUS DECOMPOSITION PRODUCTS: Material does not decompose under normal conditions of use. When heated to extreme temperatures creosote emits acrid smoke.

HAZARDOUS POLYMERIZATION: Will not occur

11. TOXICOLOGICAL INFORMATION

IMMEDIATE (ACUTE) EFFECTS: Oral LD_{50}; 725 mg/kg (rat); 433 mg/kg (mouse)

DELAYED (SUBCHRONIC AND CHRONIC) EFFECTS: Several studies in mice have shown the formation of both local (i.e. skin) and distant (i.e. lung) tumor formation after dermal exposure to creosote. [Poel & Kammer. 1957; Roe et al, 1958]

OTHER DATA: Has caused mutations in *S. typhimurium* strains TA98. TA100, TA1537, TA1538 and mouse lymphoma cell L5178y. [Fed Reg., 1978; Bos et al, 1983] Death from large doses of creosote appears due primarily to cardiovascular collapse. Fatalities have occurred 14-36 hours after the ingestion of creosote (about 7g for adults; about 1 or 2g for children). [Clayton & Clayton, 3rd ed., 1981]

12. ECOLOCICAL INFORMATION

TL_{50}, *Carassius auratus* (goldfish); 3.51 ppm/24 hours [60:40 mixture of creosote & coal tar]
TL_{50}, *Lepomis macrochirus* (bluegill); 4.42 ppm/24 hours [60:40 mixture of creosote & coal tar]
TL_{50}, *Salnio gairdner* (rainbow trout); 3.72 ppm/24 hours [60:40 mixture of creosote & coal tar]
LD_{50}, *Colinus virginianus* (bobwhite quail); 1260 ppm/8 days [60:40 mixture of creosote & coal tar]
LD_{50}, *Anas platyrhynchos* (mallard duck); 10,388 ppm/8 days [60:40 mixture of creosote & coal tar]

13. DISPOSAL CONSIDERATIONS

RCRA

Is the unused product a RCRA hazardous waste if discarded? YES
If yes, the RCRA ID number is: U051

OTHER DISPOSAL CONSIDERATIONS:

Other waste code designations for creosote containing wastes appear in the December 6, 1990 *Federal Register* as F034; Wastewater's, process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use creosote formulations. This listing does not include K001 bottom sediment sludge from the treatment of wastewater from wood preserving processes that use creosote and/or pentachloraphenol. Please consult with the appropriate state regulatory authorities to determine when the F034 designation is effective in the given state.

Creosote-containing waste may also be characteristic hazardous wastes, even if not meeting the U051, K001, or F034 waste code designation.

The information offered here is for the product as shipped. Use and/or alterations to the product such as mixing with other materials may significantly change the characteristics of the material and alter the RCRA classification and the proper disposal method.

14. TRANSPORT INFORMATION

US DOT HAZARD CLASS: Environmentally Hazardous Substance, Liquid, N.O.S. (Creosote). 9
US DOT ID NUMBER: UN 3082
US DOT SHIPPING NAME: RQ, Environmentally Hazardous Substance, Liquid, N.O.S. (Creosote), 9, UN3082, III

For additional information on shipping regulations affecting this material, contact the number found in Section 1.

I5. REGULATORY INFORMATION

TOXIC SUBSTANCES CONTROL ACT (TSCA)

TSCA INVENTORY STATUS: Listed on EPA's TSCA Inventory
OTHER TSCA ISSUES: Substance of unknown or variable composition

SARA TITLE III/CERCLA

"Reportable Quantities" (RQs) and/or "Threshold Planning Quantities" (TPQs) exist for the following ingredients.

INGREDIENT NAME	WEIGHT %	SARA/CERCLA RQ (LB)	SARA EHS TPQ (LB)
Creosote	100 %	1	None

Spills or releases resulting in the loss of any ingredient at or above its RQ requires immediate notification to the National Response Center [(800) 424-8802], State Emergency Response Commission and to your Local Emergency Planning Committee.

SECTION 311 HAZARD CLASS: Immediate, Delayed, Fire

SARA 313 TOXIC CHEMICALS:
The following ingredients are SARA 313 "Toxic Chemicals". CAS numbers and weight percents an found in Section 2.

INGREDIENT NAME	WEIGHT	COMMENT
Creosote	100%	de minimus concentration is 0.1%

STATE-RIGHT-TO-KNOW

In addition to the ingredients found In Section 2, the following are listed for state right-to-know purposes.

INGREDIENT NAME	WEIGHT	COMMENT
None		

ADDITIONAL REGULATORY INFORMATION: For some applications, Creosote is also regulated as a "Restricted Use" pesticide under the Federal Insecticide, Fungicide. and Rodenticide Act (FIFRA).

WHMIS CLASSIFICATION (CANADA): Class D, Division 2, Subdivision A, very toxic material

FOREIGN INVENTORY STATUS: Listed on the EINECS Inventory - ID# 2322875
Listed on Canadian Inventory Domestic Substance List (DSL)

16. OTHER INFORMATION

CURRENT ISSUE DATE: March 2003
PREVIOUS ISSUE DATE: January 2002

CHANGES TO MSDS FROM PREVIOUS ISSUE DATE ARE DUE TO THE FOLLOWING:

Updated DOT transportation information
Updated to include 16-section ANSI format for Material Safety Data Sheets

OTHER INFORMATION: NFPA Hazard Ratings:
Health (Blue): 2
Flammability (Red): 2
Reactivity (Yellow): 0

REFERENCES:

1. ACGIH (1995): *"1995-1996 Threshold Limit Values...."*
2. USDOL/OSHA General Industry 29 CFR 1910.1000 Coal Tar Pitch Volatile (CTPV) Permissible Exposure Limit
3. USEPA 40 CFR Parts 112; 261; 268; 300
4. USDOT 49 CFR Part 172
5. USEPA(1986) *"Evaluation of the Potential Carcinogenicity of Creosote (8001-58-9)"*, Prepared by the Carcinogen Assessment Group, Office of Health and Environmental Assessment, Washington, DC for the Office of Emergency and Remedial Response and the Office of Solid Waste and Emergency Response, Washington, DC
6. National Fire Prevention Association (1991): *"Fire Protection Guide on Hazardous Materials"*, 10th ed. NFPA:Quincy, MA, pg 325M-29, 491M.
7 USEPA (1980) *"Health and Environmental Effects of Creosote"*, EPA # 53, pg 53-12
8. Clayton & Clayton, eds (1981): *"Patty's Industrial Hygiene & Toxicology, Volume 2A, 2B, 2C Toxicology"*, 3rd ed. John Wiley & Sons, New York, NY
9. NIOSH (1977): *"Criteria for a recommended standard...Occupational Exposure to Coal Tar Products"*, USDHEW/NIOSH Publication # 78-107
10. Poel, W.E. and Kammer, A.G. (1957): *"Experimental carcinogenicity of coal-tar fractions: The carcinogenicity of creosote oils"* J NATL CANCER INST 18(1):41-55
11. Roe, F.J.C., Bosch, D., Boutwell, R.K. (1958): *The carcinogenicity of creosote oil: The induction of lung tumors in mice"* CANCER RES 18:1176-1178
12. Bos, R.P., Hulshof, C.T.J., Theuws, J.L.G., Hendershon, P.Th. (1983): *"Mutagenicity of creosote in the Salmonella/microsome assay"* MUT RES 119:21-25
13. FEDERAL REGISTER (1978), Vol 43 #200; October 18th, page 48199
14. IARC (1987): *Monographs on the Evaluation of the Carcinogenic Risk of Chemicals to Man"*, World Health Organization (WHO): Geneva p S7 177
15. NTP (1994): *"National Toxicology Program's 7th Annual Report on Carcinogens 1994 - Summary"*

ALDRICH CHEMICAL CO -- DIELDRIN, TECH., CA. 90%, 29121-8 -- 6810-00N037359

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

Product ID:DIELDRIN, TECH., CA. 90%, 29121-8
MSDS Date:01/07/1992
FSC:6810
NIIN:00N037359
MSDS Number: BQRWJ
=== Responsible Party ===
Company Name:ALDRICH CHEMICAL CO
Box:355
City:MILWAUKEE
State:WI
ZIP:53201
Country:US
Info Phone Num:414-273-3850
Emergency Phone Num:414-273-3850
CAGE:60928
=== Contractor Identification ===
Company Name:ALDRICH CHEMICAL CO INC
Address:1001 WEST ST PAUL AVE
Box:355
City:MILWAUKEE
State:WI
ZIP:53233
Country:US
Phone:414-273-3850
CAGE:60928

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

Ingred Name:1,4:5,8-DIMETHANONAPHTHALENE, 1,2,3,4,10,10-HEXACHLORO-6,
7-EPOXY- 1,4,4A,5,6,7,8,8A-OCTAHYDRO, ENDO, EXO-; (ING 2)
CAS:60-57-1
RTECS #:IO1750000
Fraction by Wt: 90%
OSHA PEL:0.25 MG/M3, S
ACGIH TLV:0.25 MG/M3, S
EPA Rpt Qty:1 LB
DOT Rpt Qty:1 LB

Ingred Name:ING 1: (DIELDRIN) (SARA III)
RTECS #:9999999ZZ

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

LD50 LC50 Mixture:LD50 (ORAL,RAT): 38300 UG/KG.
Routes of Entry: Inhalation:YES Skin:YES Ingestion:NO
Reports of Carcinogenicity:NTP:NO IARC:NO OSHA:NO
Health Hazards Acute and Chronic:ACUTE:MAY BE FATAL IF INHALED,
SWALLOWED, OR ABSORBED THROUGH SKIN. MAY CAUSE IRRITATION. CHRONIC:
CARCINOGEN. MAY ALTER GENETIC MATERIAL. OVEREXPOSURE MAY CAUSE
REPRODUCTIVE DISORDER(S) BASED ON TEST S WITH LABORATORY ANIMALS.
TARGET ORGANS: CENTRAL NERVOUS SYSTEM, LIVER, BLOOD. OVEREXPOSURE
CAN CAUSE (EFTS OF OVEREXP)
Explanation of Carcinogenicity:NOT RELEVANT.
Effects of Overexposure:HLTH HAZ: MALAISE, HEADACHE, NAUSEA, VOMITING,
DIZZINESS, TREMORS, CLONIC AND TONIC CONVULSIONS, COMA, RESPIRATORY
FAILURE.
Medical Cond Aggravated by Exposure:NONE SPECIFIED BY MANUFACTURER.

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

First Aid:EYES: IMMEDIATELY FLUSH WITH COPIOUS AMOUNTS OF WATER FOR AT
LEAST 15 MINUTES. SKIN: IMMEDIATELY FLUSH WITH COPIOUS AMOUNTS OF

WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SH OES. INHALATION: REMOVE TO FRESH AIR. IF NOT BREATHING GIVE ARTIFICIAL RESPIRATION. IF BREATHING IS DIFFICULT, GIVE OXYGEN. INGESTION: WASH OUT MOUTH W/WATER PROVIDED PERSON IS CONSCIOUS. CALL PHYS.

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

Extinguishing Media:WATER SPRAY, CARBON DIOXIDE, DRY CHEMICAL POWDER OR APPROPRIATE FOAM.
Fire Fighting Procedures:WEAR NIOSH/MSHA APPROVED SCBA AND FULL PROTECTIVE EQUIPMENT .
Unusual Fire/Explosion Hazard:EMITS TOXIC FUMES UNDER FIRE CONDITIONS.

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

Spill Release Procedures:EVACUATE AREA. WEAR NIOSH/MSHA APPROVED SCBA, RUBBER BOOTS AND HEAVY RUBBER GLOVES. SWEEP UP, PLACE IN BAG AND HOLD FOR WASTE DISPOSAL. AVOID RAISING DUST. VENTILATE AREA AND WASH SPILL SITE AFTER MAT ERIAL PICKUP IS COMPLETE.
Neutralizing Agent:NONE SPECIFIED BY MANUFACTURER.

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

Handling and Storage Precautions:KEEP TIGHTLY CLOSED. STORE IN A COOL DRY PLACE.
Other Precautions:HIGHLY TOX.CARCIN. MUTAGEN. REPROD HAZ.MAY CAUSE CANCER.MAY CAUSE INHERITABLE GENETIC DMG. READILY ABSORB THRU SKIN. AVOID PRLNGD/RPTD EXPOS. DO NOT BRTH DUST. DO NOT GET IN EYES,ON SKIN,ON CLTHG.VERY TOX BY INHAL,IN CONT W/SKIN & (SUPDAT)

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

Respiratory Protection:WEAR APPROPRIATE NIOSH/MSHA APPROVED RESPIRATOR.
Ventilation:USE ONLY IN A CHEMICAL FUME HOOD.
Protective Gloves:CHEMICAL-RESISTANT GLOVES.
Eye Protection:CHEM WORK GOG W/FULL LNGTH FCSHLD
Other Protective Equipment:OTHER PROTECTIVE CLOTHING. SAFETY SHOWER AND EYE BATH.
Work Hygienic Practices:WASH THOROUGHLY AFTER HANDLING.
Supplemental Safety and Health
OTHER PRECAUTIONS: IF SWALLOWED. IF YOU FEEL UNWELL, SEEK MEDICAL ADVICE (SHOW THE LABEL WHERE POSSIBLE).

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

Melt/Freeze Pt:M.P/F.P Text:>289F,>143C
Vapor Density:13.2
Appearance and Odor:ORANGE-TAN POWDER.

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

Stability Indicator/Materials to Avoid:YES
STRONG OXIDIZING AGENTS.
Stability Condition to Avoid:NONE SPECIFIED BY MANUFACTURER.
Hazardous Decomposition Products:TOXIC FUMES OF CARBON MONOXIDE, CARBON DIOXIDE, HYDROGEN CHLORIDE GAS.

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

Waste Disposal Methods:DISSOLVE OR MIX MATERIAL WITH COMBUSTIBLE SOLVENT AND BURN IN A CHEMICAL INCINERATOR EQUIPPED WITH AN AFTERBURNER AND SCURBBER. DISPOSE OF IN ACCORDANCE WITH FEDERAL, STATE, AND LOCAL REGULATIONS (FP N).

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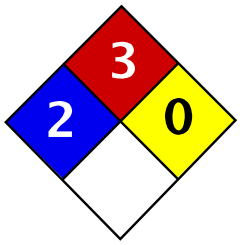

Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet
Ethylbenzene MSDS

Section 1: Chemical Product and Company Identification

Product Name: Ethylbenzene

Catalog Codes: SLE2044

CAS#: 100-41-4

RTECS: DA0700000

TSCA: TSCA 8(b) inventory: Ethylbenzene

CI#: Not available.

Synonym: Ethyl Benzene; Ethylbenzol; Phenylethane

Chemical Name: Ethylbenzene

Chemical Formula: C8H10

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
Ethylbenzene	100-41-4	100

Toxicological Data on Ingredients: Ethylbenzene: ORAL (LD50): Acute: 3500 mg/kg [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Hazardous in case of eye contact (irritant), of ingestion, of inhalation. Slightly hazardous in case of skin contact (irritant, permeator).

Potential Chronic Health Effects:
Slightly hazardous in case of skin contact (irritant, sensitizer).
CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC.
MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance may be toxic to central nervous system (CNS).
Repeated or prolonged exposure to the substance can produce target organs damage.

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. WARM water MUST be used. Get medical attention.

Skin Contact: Wash with soap and water. Cover the irritated skin with an emollient. Get medical attention if irritation develops.

Serious Skin Contact: Not available.

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 medical attention.

Ingestion:
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 if symptoms appear.

Serious Ingestion: Not available.

Section 5: Fire and Explosion Data

Flammability of the Product: Flammable.

Auto-Ignition Temperature: 432°C (809.6°F)

Flash Points:
CLOSED CUP: 15°C (59°F). (Tagliabue.) OPEN CUP: 26.667°C (80°F) (Cleveland) (CHRIS, 2001)
CLOSED CUP: 12.8 C (55 F) (Bingham et al, 2001; NIOSH, 2001)
CLOSED CUP: 21 C (70 F) (NFPA)

Flammable Limits: LOWER: 0.8% - 1.6%UPPER: 6.7% - 7%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Highly flammable in presence of open flames and sparks, of heat.

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.
Slightly explosive in presence of heat.

Fire Fighting Media and Instructions:
Flammable liquid, soluble or dispersed in water.
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards:
Vapor may travel considerable distance to source of ignition and flash back. Vapors may form explosive mixtures with air. When heated to decomposition it emits acrid smoke and irritating fumes.

Special Remarks on Explosion Hazards: Vapors may form explosive mixtures in air.

Section 6: Accidental Release Measures

Small Spill: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Flammable liquid.
Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. 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 away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapor/spray. 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:
Store in a segregated and approved area. Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Sensitive to light. Store in light-resistant containers.

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:
Splash goggles. Lab coat. Vapor 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 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:
TWA: 100 STEL: 125 (ppm) from OSHA (PEL) [United States]
TWA: 435 STEL: 545 from OSHA (PEL) [United States]
TWA: 435 STEL: 545 (mg/m3) from NIOSH [United States]
TWA: 100 STEL: 125 (ppm) from NIOSH [United States]
TWA: 100 STEL: 125 (ppm) from ACGIH (TLV) [United States]
TWA: 100 STEL: 125 (ppm) [United Kingdom (UK)]
TWA: 100 STEL: 125 (ppm) [Belgium]
TWA: 100 STEL: 125 (ppm) [Finland]
TWA: 50 (ppm) [Norway]
Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Sweetish. Gasoline-like. Aromatic.

Taste: Not available.

Molecular Weight: 106.16 g/mole

Color: Colorless.

pH (1% soln/water): Not available.

Boiling Point: 136°C (276.8°F)

Melting Point: -94.9 (-138.8°F)

Critical Temperature: 617.15°C (1142.9°F)

Specific Gravity: 0.867 (Water = 1)

Vapor Pressure: 0.9 kPa (@ 20°C)

Vapor Density: 3.66 (Air = 1)

Volatility: 100% (v/v).

Odor Threshold: 140 ppm

Water/Oil Dist. Coeff.: The product is more soluble in oil; log(oil/water) = 3.1

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, diethyl ether.

Solubility:
Easily soluble in diethyl ether.
Very slightly soluble in cold water or practically insoluble in water.
Soluble in all proportions in Ethyl alcohol.
Soluble in Carbon tetrachloride, Benzene.
Insoluble in Ammonia.
Slightly soluble in Chloroform.
Solubility in Water: 169 mg/l @ 25 deg. C.; 0.014 g/100 ml @ 15 deg. C.

Section 10: Stability and Reactivity Data

Stability: The product is stable.

Instability Temperature: Not available.

Conditions of Instability: Heat, ingnition sources (flames, sparks, static), incompatible materials, light

Incompatibility with various substances: Reactive with oxidizing agents.

Corrosivity: Not considered to be corrosive for metals and glass.

Special Remarks on Reactivity:
Can react vigorously with oxidizing materials.
Sensitive to light.

Special Remarks on Corrosivity: Not available.

Polymerization: Will not occur.

Section 11: Toxicological Information

Routes of Entry: Absorbed through skin. Inhalation.

Toxicity to Animals: Acute oral toxicity (LD50): 3500 mg/kg [Rat].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified 2B (Possible for human.) by IARC.
MUTAGENIC EFFECTS: Mutagenic for mammalian somatic cells. Mutagenic for bacteria and/or yeast.
May cause damage to the following organs: central nervous system (CNS).

Other Toxic Effects on Humans:
Hazardous in case of ingestion, of inhalation.
Slightly hazardous in case of skin contact (irritant, permeator).

Special Remarks on Toxicity to Animals:
Lethal Dose/Conc 50% Kill:
LD50 [Rabbit] - Route: Skin; Dose: 17800 ul/kg
Lowest Published Lethal Dose/Conc:
LDL[Rat] - Route: Inhalation (vapor); Dose: 4000 ppm/4 H

Special Remarks on Chronic Effects on Humans:
May cause adverse reproductive effects and birth defects (teratogenic) based on animal test data.
May cause cancer based on animals data. IARC evidence for carcinogenicity in animals is sufficient. IARC evidence of carcinogenicity in humans inadequate.
May affect genetic material (mutagenic).

Special Remarks on other Toxic Effects on Humans:
Acute Potential Health Effects:
Skin: Can cause mild skin irritation. It can be absorbed through intact skin.
Eyes: Contact with vapor or liquid can cause severe eye irritation depending on concentration. It may also cause conjunctivitis. At a vapor exposure level of 85 - 200 ppm , it is mildly and transiently irritating to the eyes; 1000 ppm causes further irritation and tearing; 2000 ppm results in immediate and severe irritation and tearing; 5,000 ppm is intolerable (ACGIH, 1991; Clayton and Clayton, 1994). Standard draize test for eye irritation using 500 mg resulted in severe irritation (RTECS)
Inhalation: Exposure to high concentrations can cause nasal, mucous membrane and respiratory tract irritation and can also result in chest constriction and, trouble breathing, respiratory failure, and even death. It can also affect behavior/Central Nervous System. The effective dose for CNS depression in experimental animals was 10,000 ppm (ACGIH, 1991). Symptoms of CNS depression include headache, nausea, weakness, dizziness, vertigo, irritability, fatigue, lightheadedness, sleepiness, tremor, loss of coordination, judgement and conciousness, coma, and death. It can also cause pulmonary edema. Inhalation of 85 ppm can produce fatigue, insomnia, headache, and mild irritation of the respiratory tract (Haley & Berndt, 1987).
Ingestion: Do not drink, pipet or siphon by mouth. May cause gastroinestinal/digestive tract irritation with Abdominal pain, nausea, vomiting. Ethylbenzene is a pulmonary aspiration hazard. Pulmonary aspiration of even small amounts of the liquid may cause fatal pneumonitis. It may also affect behavior/central nervous system with

Section 12: Ecological Information

Ecotoxicity:
Ecotoxicity in water (LC50): 14 mg/l 96 hours [Fish (Trout)] (static). 12.1 mg/l 96 hours [Fish (Fathead Minnow)] (flow-through)]. 150 mg/l 96 hours [Fish (Blue Gill/Sunfish)] (static). 275 mg/l 96 hours [Fish (Sheepshead Minnow)]. 42.3 mg/l 96 hours [Fish (Fathead Minnow)](soft water). 87.6mg/l 96 hours [Shrimp].

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 3: Flammable liquid.

Identification: : Ethylbenzene UNNA: 1175 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Connecticut hazardous material survey.: Ethylbenzene
Illinois toxic substances disclosure to employee act: Ethylbenzene
Illinois chemical safety act: Ethylbenzene
New York release reporting list: Ethylbenzene
Rhode Island RTK hazardous substances: Ethylbenzene
Pennsylvania RTK: Ethylbenzene
Minnesota: Ethylbenzene
Massachusetts RTK: Ethylbenzene
Massachusetts spill list: Ethylbenzene
New Jersey: Ethylbenzene
New Jersey spill list: Ethylbenzene
Louisiana spill reporting: Ethylbenzene
California Director's List of Hazardous Substances: Ethylbenzene
TSCA 8(b) inventory: Ethylbenzene
TSCA 4(a) proposed test rules: Ethylbenzene
TSCA 8(d) H and S data reporting: Ethylbenzene: Effective Date: 6/19/87; Sunset Date: 6/19/97
SARA 313 toxic chemical notification and release reporting: Ethylbenzene

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-2: Flammable liquid with a flash point lower than 37.8°C (100°F).
CLASS D-2A: Material causing other toxic effects (VERY TOXIC).
CLASSE D-2B: Material causing other toxic effects (TOXIC).

DSCL (EEC):
R11- Highly flammable.
R20- Harmful by inhalation.
S16- Keep away from sources of ignition - No smoking.
S24/25- Avoid contact with skin and eyes.
S29- Do not empty into drains.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Vapor 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:
-Manufacturer's Material Safety Data Sheet.
-Fire Protection Guide to Hazardous Materials, 13th ed., National Fire Protection Association (NFPA)
-Registry of Toxic Effects of Chemical Substances (RTECS)
-Chemical Hazard Response Information System (CHRIS)
-Hazardous Substance Data Bank (HSDB)
-New Jersey Hazardous Substance Fact Sheet
-Ariel Global View
-Reprotext System

Other Special Considerations: Not available.

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METAL

MATERIAL SAFETY DATA SHEET

ALDON CORPORATION
221 Rochester Street
Avon, New York 14414-9409
(585) 226-6177

MSDS No.: LL0070 LL0079 LL0080 LL0081 LL0082 LL0085 LL0086
Effective Date: March 29, 2005

SECTION I NAME

Product	Lead Metal
Chemical Synonyms	N/A
Formula	Pb
Unit Size	up to 2.5 Kg.
C.A.S. No.	7439-92-1

24 HOUR EMERGENCY ASSISTANCE

CHEMTREC 800-424-9300
Day 585-226-6177

NFPA

Health	3
Fire	0
Reactivity	0

HMIS *

HAZARD RATING
MINIMAL 0 SLIGHT 1 MODERATE 2 SERIOUS 3 SEVERE 4

SECTION II INGREDIENTS OF MIXTURES

Principal Component(s)	%	TLV Units
Lead metal, shot, granular, sheet, foil	99+%	See Section V.
CAUTION! MAY BE HARMFUL OR FATAL IF SWALLOWED		
OR INHALED AS FUMES OR DUST.		

SECTION III PHYSICAL DATA

Melting Point (°F)	Approx. 327.4°C (621°F)	Specific Gravity (H_2O = 1)	11.34 (20/4°C)
Boiling Point (°F)	1753°C (3187°F)	Percent Volatile by Volume (%)	0% at ambient temp.
Vapor Pressure (mm Hg)	N/A	Evaporation Rate (=1)	Non-volatile (N/A).
Vapor Density (Air=1)	N/A		
Solubility in Water	Insoluble.		
Appearance & Odor	Bluish, silvery, gray soft metal, granular, shot, sheet, foil; no odor.		

SECTION IV FIRE AND EXPLOSION HAZARD DATA

Flash Point (Method Used)	Non-flammable (N/A).	Flammable Limits in Air % by Volume	Lower --------	Upper --------
Extinguisher Media	Dry chemical or carbon dioxide should be used on surrounding fire. Do not use water on fires where molten metal is present.	N/A		

SPECIAL FIREFIGHTING PROCEDURES

In fire conditions, wear a NIOSH/MSHA-approved self-contained breathing apparatus and full protective clothing.

UNUSUAL FIRE AND EXPLOSION HAZARDS

When heated emits toxic fumes of lead which can react vigorously with oxidizing materials.

D.O.T. Non Regulated.

Approved by U.S. Department of Labor "essentially similar" to form OSHA-20

SECTION V HEALTH HAZARD DATA LL0070

Threshold Limited Value
Lead as inorganic compounds, as Pb: TWA 0.05 mg/m^3 (ACGIH 2001).

Effects of Overexposure
SKIN: Not absorbed through skin. EYES: No specific hazard known. Contact may cause transient irritation. INGESTION: May produce anorexia, vomiting, malaise, convulsions due to increased intracranial pressure. INHALATION: Of dust or fumes can cause lead poisoning. Target organs: Lungs, kidneys.

Emergency and First Aid Procedures
INGESTION: Call physician or Poison Control Center immediately. Induce vomiting only if advised by appropriate medical personnel. Never give anything by mouth to an unconscious person. EYES: Check for and remove contact lenses. Flush thoroughly with water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get immediate medical attention. SKIN: Remove contaminated clothing. Flush thoroughly with mild soap and water. If irritation occurs, get medical attention. INHALATION: Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.

SECTION VI REACTIVITY DATA

Stability			Conditions to Avoid
	Unstable		High temperatures to produce fumes.
	Stable	X	

Incompatibility (Materials to Avoid) Strong oxidizing materials.

Hazardous Decomposition Products When heated, emits toxic fumes of lead.

Hazardous Polymerization		Conditions to Avoid
May Occur	Will Not Occur	Not applicable.
	X	

SECTION VII SPILL OR LEAK PROCEDURES

Steps to be taken in case material is released or spilled
Carefully sweep up without producing dust and recycle for use or place in a suitable container for disposal.

Waste Disposal Method
Discharge, treatment, or disposal may be subject to Federal, State or Local laws. These disposal guidelines are intended for the disposal of catalog-size quantities only.
Dispose of in an approved chemical landfill or contract with a licensed waste disposal service.

SECTION VIII SPECIAL PROTECTION INFORMATION

Respiration Protection (Specify Type) None should be needed in normal laboratory use at room temperature. If dusty conditions prevail, work in ventilation hood or wear a NIOSH/MSHA-approved dust mask or respirator.

Ventilation				
	Local Exhaust	None needed.	Special	No.
	Mechanical (General)	None needed.	Other	No.

Protective Gloves	Recommended - leather.	Eye Protection	Chemical safety glasses.

Other Protective Equipment Smock, apron, eye wash station, lab coat, ventilation hood.

SECTION IX SPECIAL PRECAUTIONS

Precautions to be Taken in Handling & Storing
Keep container tightly closed when not in use.
Store in a cool, dry place away from fire hazards. Wash thoroughly after handling. Remove and wash contaminated clothing.

Other Precautions Read label on container before using. Do not wear contact lenses when working with chemicals. For laboratory use only. Not for drug, food or household use. Keep out of reach of children.

Lead can react violently with oxidizing materials. Water may become trapped within surface cracks which may cause an explosion when the metal is molten.

Revision No. 9	Date 03/29/05	Approved Michael Raszeja	Chemical Safety Coordinator MR

METAL

10 M

Material Safety Data Sheet
Mercury

ACC# 14020

Section 1 - Chemical Product and Company Identification

MSDS Name: Mercury
Catalog Numbers: S40672B, S41542, S41599, S41599B, S41599E, S41599G, S41599J, S41599K, S41599M, S41600P, S41600S, S41600W, S41630A, S41630B, S41630C, S41631, S41631A, S41631B, S41631C, S41645, S45245, S46981, S50443, S71966, S71967, S71968, S78777, 13501, M139-1LB, M139-5LB, M140-14LB, M140-1LB, M140-5LB, M141-1LB, M141-6LB, NC9534278
Synonyms: Colloidal mercury; Hydrargyrum; Metallic mercury; Quick silver; Liquid silver.
Company Identification:

Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410

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

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
7439-97-6	Mercury	100	231-106-7

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: silver liquid.
Danger! Corrosive. Harmful if inhaled. May be absorbed through intact skin. Causes eye and skin irritation and possible burns. May cause severe respiratory tract irritation with possible burns. May cause severe digestive tract irritation with possible burns. May cause central nervous system effects. Inhalation of fumes may cause metal-fume fever. May cause liver and kidney damage. Possible sensitizer. This substance has caused adverse reproductive and fetal effects in animals.
Target Organs: Blood, kidneys, central nervous system, liver, brain.

Potential Health Effects
Eye: Exposure to mercury or mercury compounds can cause discoloration on the front surface of the lens, which does not interfere with vision. Causes eye irritation and possible burns. Contact with mercury or mercury compounds can cause ulceration of the conjunctiva and cornea.
Skin: May be absorbed through the skin in harmful amounts. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material. Causes skin irritation and possible burns. May cause skin rash (in milder cases), and cold and clammy skin with cyanosis or pale color.
Ingestion: May cause severe and permanent damage to the digestive tract. May cause perforation

of the digestive tract. May cause effects similar to those for inhalation exposure. May cause systemic effects.
Inhalation: Causes chemical burns to the respiratory tract. Inhalation of fumes may cause metal fume fever, which is characterized by flu-like symptoms with metallic taste, fever, chills, cough, weakness, chest pain, muscle pain and increased white blood cell count. May cause central nervous system effects including vertigo, anxiety, depression, muscle incoordination, and emotional instability. Aspiration may lead to pulmonary edema. May cause systemic effects. May cause respiratory sensitization.
Chronic: May cause liver and kidney damage. May cause reproductive and fetal effects. Effects may be delayed. Chronic exposure to mercury may cause permanent central nervous system damage, fatigue, weight loss, tremors, personality changes. Chronic ingestion may cause accumulation of mercury in body tissues. Prolonged or repeated exposure may cause inflammation of the mouth and gums, excessive salivation, and loosening of the teeth.

Section 4 - First Aid Measures

Eyes: Get medical aid immediately. Do NOT allow victim to rub eyes or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).
Skin: Get medical aid immediately. Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.
Ingestion: Do not induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately. Wash mouth out with water.
Inhalation: Get medical aid immediately. Remove from exposure and move to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.
Notes to Physician: The concentration of mercury in whole blood is a reasonable measure of the body-burden of mercury and thus is used for monitoring purposes. Treat symptomatically and supportively. Persons with kidney disease, chronic respiratory disease, liver disease, or skin disease may be at increased risk from exposure to this substance.
Antidote: The use of d-Penicillamine as a chelating agent should be determined by qualified medical personnel. The use of Dimercaprol or BAL (British Anti-Lewisite) as a chelating agent should be determined by qualified medical personnel.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion.
Extinguishing Media: Substance is nonflammable; use agent most appropriate to extinguish surrounding fire. Use water spray, dry chemical, carbon dioxide, or appropriate foam.
Flash Point: Not applicable.
Autoignition Temperature: Not applicable.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: (estimated) Health: 3; Flammability: 0; Instability: 0

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Absorb spill with inert material (e.g. vermiculite, sand or earth), then place in suitable container. Avoid runoff into storm sewers and ditches which lead to waterways. Clean up spills immediately, observing precautions in the Protective Equipment section. Provide ventilation.

Section 7 - Handling and Storage

Handling: Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Minimize dust generation and accumulation. Keep container tightly closed. Do not get on skin or in eyes. Do not ingest or inhale. Use only in a chemical fume hood. Discard contaminated shoes. Do not breathe vapor.
Storage: Keep container closed when not in use. Store in a tightly closed container. Store in a cool, dry, well-ventilated area away from incompatible substances. Keep away from metals. Store protected from azides.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Facilities storing or utilizing this material should be equipped with an eyewash facility and a safety shower. Use only under a chemical fume hood.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Mercury	0.025 mg/m3 TWA; Skin - potential significant contribution to overall exposure by the cutaneous r oute	0.05 mg/m3 TWA (vapor) 10 mg/m3 IDLH	0.1 mg/m3 Ceiling (vapor)

OSHA Vacated PELs: Mercury: 0.05 mg/m3 TWA (vapor)
Personal Protective Equipment
Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.
Skin: Wear appropriate protective gloves to prevent skin exposure.
Clothing: Wear appropriate protective clothing to prevent skin exposure.
Respirators: A respiratory protection program that meets OSHA's 29 CFR 1910.134 and ANSI Z88.2 requirements or European Standard EN 149 must be followed whenever workplace conditions warrant respirator use.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: silver
Odor: odorless
pH: Not available.

Vapor Pressure: 0.002 mm Hg @ 25C
Vapor Density: 7.0
Evaporation Rate: Not available.
Viscosity: 15.5 mP @ 25 deg C
Boiling Point: 356.72 deg C
Freezing/Melting Point:-38.87 deg C
Decomposition Temperature: Not available.
Solubility: Insoluble.
Specific Gravity/Density:13.59 (water=1)
Molecular Formula: Hg
Molecular Weight:200.59

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: High temperatures, incompatible materials.
Incompatibilities with Other Materials: Oxygen, sulfur, acetylene, ammonia, chlorine dioxide, azides, chlorates, nitrates, sulfuric acid, halogens, rubidium, calcium, 3-bromopropyne, ethylene oxide, lithium, methylsilane + oxygen, peroxyformic acid, tetracarbonylnickel + oxygen, copper, copper alloys, boron diiodophosphide, metals, nitromethane, sodium carbide, aluminum, lead, iron, metal oxides.
Hazardous Decomposition Products: Mercury/mercury oxides.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 7439-97-6: OV4550000
LD50/LC50:
Not available.

Carcinogenicity:
CAS# 7439-97-6: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: Intraperitoneal, rat: TDLo = 400 mg/kg/14D-I (Tumorigenic - equivocal tumorigenic agent by RTECS criteria - tumors at site of application).
Teratogenicity: Inhalation, rat: TCLo = 1 mg/m3/24H (female 1-20 day(s) after conception) Effects on Embryo or Fetus - fetotoxicity (except death, e.g., stunted fetus).
Reproductive Effects: Inhalation, rat: TCLo = 890 ng/m3/24H (male 16 week(s) pre-mating) Paternal Effects - spermatogenesis (incl. genetic material, sperm morphology, motility, and count).; Inhalation, rat: TCLo = 7440 ng/m3/24H (male 16 week(s) pre-mating) Fertility - post-implantation mortality (e.g. dead and/or resorbed implants per total number of implants).
Mutagenicity: Cytogenetic Analysis: Unreported, man = 150 ug/m3.
Neurotoxicity: The brain is the critical organ in humans for chronic vapor exposure; in severe cases, spontaneous degeneration of the brain cortex can occur as a late sequela to past exposure.
Other Studies:

Section 12 - Ecological Information

Ecotoxicity: Fish: Rainbow trout: LC50 = 0.16-0.90 mg/L; 96 Hr; UnspecifiedFish: Bluegill/Sunfish: LC50 = 0.16-0.90 mg/L; 96 Hr; UnspecifiedFish: Channel catfish: LC50 = 0.35 mg/L; 96 Hr; UnspecifiedWater flea Daphnia: EC50 = 0.01 mg/L; 48 Hr; Unspecified In aquatic systems, mercury appears to bind to dissolved matter or fine particulates, while the transport of mercury bound to dust particles in the atmosphere or bed sediment particles in rivers and lakes is generally less substantial. The conversion, in aquatic environments, of inorganic mercury cmpd to methyl mercury implies that recycling of mercury from sediment to water to air and back could be a rapid process.
Environmental: Mercury bioaccumulates and concentrates in food chain (concentration may be as much as 10,000 times that of water). Bioconcentration factors of 63,000 for freshwater fish and 10,000 for salt water fish have been found. Much of the mercury deposited on land, appears to revaporize within a day or two, at least in areas substantially heated by sunlight.
Physical: All forms of mercury (Hg) (metal, vapor, inorganic, or organic) are converted to methyl mercury. Inorganic forms are converted by microbial action in the atmosphere to methyl mercury.
Other: No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 7439-97-6: waste number U151.

Section 14 - Transport Information

	US DOT	Canada TDG
Shipping Name:	MERCURY	MERCURY
Hazard Class:	8	8
UN Number:	UN2809	UN2809
Packing Group:	III	III

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7439-97-6 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
CERCLA Hazardous Substances and corresponding RQs

CAS# 7439-97-6: 1 lb final RQ; 0.454 kg final RQ

SARA Section 302 Extremely Hazardous Substances

None of the chemicals in this product have a TPQ.

SARA Codes

CAS # 7439-97-6: acute, chronic.

Section 313

This material contains Mercury (CAS# 7439-97-6, 100%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

CAS# 7439-97-6 (listed as Mercury compounds) is listed as a hazardous air pollutant (HAP).

This material does not contain any Class 1 Ozone depletors.

This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

None of the chemicals in this product are listed as Hazardous Substances under the CWA.

CAS# 7439-97-6 is listed as a Priority Pollutant under the Clean Water Act. CAS# 7439-97-6 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 7439-97-6 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

California Prop 65

WARNING: This product contains Mercury, a chemical known to the state of California to cause developmental reproductive toxicity.

California No Significant Risk Level: None of the chemicals in this product are listed.

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

T N

Risk Phrases:

R 23 Toxic by inhalation.

R 33 Danger of cumulative effects.

R 50/53 Very toxic to aquatic organisms, may cause long-term adverse effects in the aquatic environment.

Safety Phrases:

S 1/2 Keep locked up and out of reach of children.

S 45 In case of accident or if you feel unwell, seek medical advice immediately (show the label where possible).

S 7 Keep container tightly closed.

S 60 This material and its container must be disposed of as hazardous waste.

S 61 Avoid release to the environment. Refer to special instructions/safety data sheets.

WGK (Water Danger/Protection)

CAS# 7439-97-6: 3

Canada - DSL/NDSL

CAS# 7439-97-6 is listed on Canada's DSL List.

Canada - WHMIS

This product has a WHMIS classification of D2A, E.

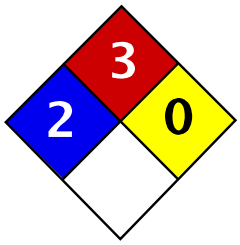
Canadian Ingredient Disclosure List

CAS# 7439-97-6 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 6/15/1999
Revision #7 Date: 1/20/2005

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 Fisher 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 Fisher has been advised of the possibility of such damages.



Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet
Methyl tert-butyl ether MSDS

Section 1: Chemical Product and Company Identification

Product Name: Methyl tert-butyl ether

Catalog Codes: SLM2152

CAS#: 1634-04-4

RTECS: KN5250000

TSCA: TSCA 8(b) inventory: Methyl tert-butyl ether

CI#: Not available.

Synonym:

Chemical Name: Methyl tert-Butyl Ether

Chemical Formula: C5-H12-O

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
Methyl {tert-}butyl ether	1634-04-4	100

Toxicological Data on Ingredients: Methyl tert-butyl ether: ORAL (LD50): Acute: 4000 mg/kg [Rat]. 5960 mg/kg [Mouse]. VAPOR (LC50): Acute: 23576 ppm 4 hour(s) [Rat].

Section 3: Hazards Identification

Potential Acute Health Effects:
Extremely hazardous in case of eye contact (irritant), of ingestion. Very hazardous in case of skin contact (irritant), of inhalation. Hazardous in case of skin contact (permeator). 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:
Extremely hazardous in case of eye contact (irritant), of ingestion.
Very hazardous in case of skin contact (irritant), of inhalation.
Hazardous in case of skin contact (permeator).
CARCINOGENIC EFFECTS: Not available.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.

The substance is toxic to lungs, the nervous system, mucous membranes.
Repeated or prolonged exposure to the substance can produce target organs damage. Repeated or prolonged inhalation of vapors may lead to chronic respiratory irritation.

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. Cold water may be used. Cover the irritated skin with an emollient. If irritation persists, seek medical attention. Wash contaminated clothing before reusing.

Serious Skin Contact:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek medical attention.

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. Seek medical attention.

Ingestion:
Do not induce vomiting. 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: 224°C (435.2°F)

Flash Points: CLOSED CUP: -28°C (-18.4°F).

Flammable Limits: LOWER: 2.5% UPPER: 15.1%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances: Flammable in presence of open flames and sparks.

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 liquid, soluble or dispersed in water.
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use alcohol foam, water spray or fog.

Special Remarks on Fire Hazards: Not available.

Special Remarks on Explosion Hazards: Not available.

Section 6: Accidental Release Measures

Small Spill:
Dilute with water and mop up, or absorb with an inert dry material and place in an appropriate waste disposal container.

Large Spill:
Flammable liquid.
Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources.

Section 7: Handling and Storage

Precautions:
Keep away from heat. Keep away from sources of ignition. Ground all equipment containing material. Do not ingest. Do not breathe gas/fumes/ vapour/spray. 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

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. A refrigerated room would be preferable for materials with a flash point lower than 37.8°C (100°F).

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:
Splash goggles. Lab coat. Vapor 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 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: Not available.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid.

Odor: Characteristic. (Strong.)

Taste: Not available.

Molecular Weight: 88.15 g/mole

Color: Clear Colorless.

pH (1% soln/water): Not available.

Boiling Point: 55.2°C (131.4°F)

Melting Point: -109°C (-164.2°F)

Critical Temperature: Not available.

Specific Gravity: 0.7405 (Water = 1)

Vapor Pressure: 245 mm of Hg (@ 20°C)

Vapor Density: 3.1 (Air = 1)

Volatility: 100% (v/v).

Odor Threshold: Not available.

Water/Oil Dist. Coeff.: Not available.

Ionicity (in Water): Not available.

Dispersion Properties: See solubility in water, methanol, diethyl ether.

Solubility:
Soluble in methanol, diethyl ether.
Partially soluble in cold 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: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: 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): 4000 mg/kg [Rat].
Acute toxicity of the vapor (LC50): 23576 ppm 4 hour(s) [Rat].

Chronic Effects on Humans: The substance is toxic to lungs, the nervous system, mucous membranes.

Other Toxic Effects on Humans:
Extremely hazardous in case of ingestion.
Very hazardous in case of skin contact (irritant), of inhalation.
Hazardous in case of skin contact (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: 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 more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Class 3: Flammable liquid.

Identification: : Methyl tert-butyl ether : UN2398 PG: II

Special Provisions for Transport: Not available.

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Methyl tert-butyl ether
Massachusetts RTK: Methyl tert-butyl ether
TSCA 8(b) inventory: Methyl tert-butyl ether
SARA 313 toxic chemical notification and release reporting: Methyl tert-butyl ether
CERCLA: Hazardous substances.: Methyl tert-butyl ether

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).
CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R11- Highly flammable.
R38- Irritating to skin.
R41- Risk of serious damage to eyes.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 0

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Vapor 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: 10/10/2005 08:23 PM

Last Updated: 10/10/2005 08:23 PM

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24 VOC

Material Safety Data Sheet

WHMIS (Pictograms)	WHMIS (Classification)	Protective Clothing
	CLASS B-4: Flammable solid. Class D-2B: Material causing other toxic effects (TOXIC).	

Section 1. Product and Company Identification

Product Name / Trade name	Naphthalene	Associated Product's Item Code	NAPHTHALENE
Synonym	Refined naphthalene	CAS #	91-20-3
Chemical Family	Aromatic hydrocarbon.	DSL	CEPA DSL: Naphthalene
Chemical Formula	$C_{10}H_8$	Validation Date	5/18/2001.
Manufacturer	Recochem Inc. 850-Montee de Liesse Montreal, Quebec 514-341-3550	Print Date	5/18/2001.
Material Uses	Consumer products: Moth preventative.	In Case of Emergency	Recochem Inc. Communications and Regulatory Affairs Department (905) 791-1788

Section 2. Hazardous Ingredients

Name	CAS #	% by Weight	Exposure Limits	
			Canadian Values (ACGIH)	U.S. Values (OSHA)
1) Naphthalene	91-20-3	100	TWA: 10 ppm from ACGIH (Canada, 1999). Period: 8 hour(s). TWA: 52 mg/m³ from ACGIH (Canada, 1999). Period: 8 hour(s). STEL: 15 ppm from ACGIH (Canada, 1999). Period: 15 minute(s). STEL: 79 mg/m³ from ACGIH (Canada, 1999). Period: 15 minute(s).	1) Naphthale TWA: 10 ppm from OSHA (United States, 1999). Period: 8 hour(s). TWA: 50 mg/m³ from OSHA (United States, 1999). Period: 8 hour(s).

Section 3. Emergency Overview

Hazard Overview	WARNING! FLAMMABLE SOLID, skin sensitizer. Harmful if swallowed. Keep out of reach of children. Keep in a cool, well-ventilated place. Avoid contact with eyes, skin and clothing. DO NOT ingest. Avoid breathing dust. Wash thoroughly after handling.
Potential Acute Health Effects	Slightly hazardous in case of skin contact (irritant), of eye contact (irritant), of ingestion, of inhalation. May cause skin sensitization.
Note to Physician	Not available.

Section 4. First Aid Measures

Eye Contact	IMMEDIATELY flush eyes with running water for at least 15 minutes, keeping eyelids open. If irritation persists, seek medical attention.
Skin Contact	After contact with skin, wash immediately with plenty of water. If irritation persists, seek medical attention.
Inhalation	Allow the victim to rest in a well ventilated area. Seek medical attention.
Ingestion	DO NOT induce vomiting. Have conscious person drink several glasses of water or milk. SEEK IMMEDIATE MEDICAL ATTENTION.

Section 5. Fire Fighting Measures

Products of Combustion	These products are carbon oxides (CO, CO_2).
Fire Fighting Media and Instructions	Flammable solid. SMALL FIRE: Use DRY chemicals, CO_2, water spray or foam. LARGE FIRE: Use water spray or fog. Cool containing vessels with water jet in order to prevent pressure build-up, autoignition or explosion.
Fire Hazards	Yields flammable vapors on heating above melting point.
Explosion Hazards	Vapour forms explosive mixture with air. Material in powder form, capable of creating a dust explosion.

Continued on Next Page

Section 6. Accidental Release Measures

Small Spill and Leak	Use appropriate tools to put the spilled material in a convenient waste disposal container.
Large Spill and Leak	Flammable product. Use water spray curtain to divert vapor drift. Eliminate all sources of ignition. Use appropriate equipment to put the spilled material in a waste disposal. Dispose of in accordance with regional regulations.

Section 7. Handling and Storage

Handling	Keep away from heat, sparks and flame. To avoid fire, minimize ignition sources. DO NOT ingest. Avoid breathing dust. After handling, always wash hands thoroughly with soap and water.
Storage	Keep container in a cool, well-ventilated area. Keep container tightly closed and sealed until ready for use. Avoid all possible sources of ignition (spark or flame). Do not store above 38°C (100.4°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	
Eyes	Safety glasses.
Body	No special protective clothing is required.
Respiratory	Wear appropriate respirator when ventilation is inadequate.
Hands	Gloves (impervious).

Section 9. Physical and Chemical Properties

Physical State and Appearance	Crystalline solid. (Flakes, chips and balls.)	**Odor**	Characteristic.
Molecular Weight	128.19 g/mole	**Taste**	Not available.
pH (1% Soln/Water)	Not applicable.	**Color**	White.
Boiling/Condensation Point	218°C (424.4°F)	**Volatility**	Not available.
Melting/Freezing Point	80.2°C (176.4°F)	**Evaporation Rate**	<1 compared to Butyl acetate.
Specific Gravity	1.162 (Water = 1)	**Odor Threshold**	>0.3 ppm
Vapor Pressure	Not applicable.	**Viscosity**	Not available.
Vapor Density	4.42 (Air = 1)	**Solubility**	Insoluble in water.
VOC Content	Not available.	**Other Properties**	Not available.
The Product is:	Combustible.		
Autoignition Temperature	526°C (978.8°F)		
Flash Points	CLOSED CUP: 79°C (174.2°F).		
Flammable Limits	LOWER: 0.9% UPPER: 5.9%		
Fire Hazards in Presence of Various Substances	Combustible in presence of open flames and sparks. Material in powder form, capable of creating a dust explosion.		

Section 10. Stability and Reactivity

Stability	The product is stable.
Conditions of Instability	No additional remark.
Incompatibility with Various Substances	Reactive with oxidizing agents, acids.

Continued on Next Page

Section 11. Toxicological Information

Routes of Entry	Inhalation. Ingestion.
Toxicity to Animals	Acute oral toxicity (LD50): >633 mg/kg [Mouse].
Acute Effects on Humans	
Eyes	Contact may cause eye irritation.
Skin	Prolonged contact can cause skin irritation.
Inhalation	Inhalation is minimal since vapours are unlikely due to physical properties. Practically non-toxic by inhalation. Inhalation may cause irritation to nose and throat.
Ingestion	Hazardous in case of ingestion.
Chronic Effects on Humans	Slightly hazardous in case of skin contact (irritant), of eye contact (irritant). CARCINOGENIC EFFECTS: Classified None by NIOSH. A4 (Not classifiable for human or animal.) by ACGIH. NTP has classified Naphthalene as a carcinogen to rats. MUTAGENIC EFFECTS: Non-mutagenic for bacteria and/or yeast. TERATOGENIC EFFECTS: Not available. DEVELOPMENTAL TOXICITY: Not available. The substance may be toxic to blood, kidneys, liver, eyes, hemolytic anemia, skin irritation. Repeated or prolonged exposure to the substance can produce target organs damage.

Section 12. Ecological Information

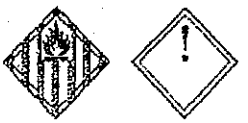
Ecotoxicity	Not available.

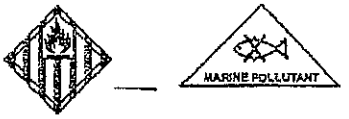
Section 13. Disposal Considerations

Waste Information	Waste must be disposed of in accordance with federal, state and local environmental control regulations.

Section 14. Transport Information

TDG Classification (Canada)	CLASS 4.1: Flammable solid. Class 9.2: Environmentally hazardous material.
PIN (Canada)	Shipping name: Naphthalene, crude or Naphthalene, refined UNNA: UN 1334 PG: III
Special Provisions for Transport (Canada)	In inner packages of 500 g capacity or less this product is classified as a "Consumer Commodity" under TDG regulations.
IMDG Classification	4.1
PIN	Shipping name: Naphthalene, refined UNNA: UN 1334 PG: III
Marine Pollutant	IMDG Class: Marine Pollutant. (Pollutant.)
DOT Classification (U.S.A)	CLASS 4.1: Flammable solid.
PIN	Naphthalene, crude or Naphthalene, refined, 4.1, UN 1334, III, Pollutant., RQ (Naphthalene)
Special Provisions for Transport (U.S.)	In inner containers of 100 lbs (45.36 kg) capacity or less this product is exempt from DOT regulations (non regulated).





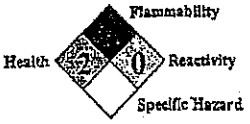
Section 15. Other Regulatory Information and Pictograms

WHMIS Classification (Canada)	CLASS B-4: Flammable solid. Class D-2B: Material causing other toxic effects (TOXIC).
HCS Classification (U.S.A.)	CLASS: Flammable solid. Class: Target organ effects.
USA Regulatory Lists	TSCA Inventory: Naphthalene

Continued on Next Page

Hazardous Material Information System (U.S.A.)		
	Health	2
	Flammability	2
	Reactivity	0
	Personal Protection	E

National Fire Protection Association (U.S.A.)



Section 16. Other Information

Validated and verified by Product Development and Technical Coordinator on 5/18/2001.	Printed 5/18/2001.

International Chemical Safety Cards

NICKEL

ICSC: 0062

NICKEL
(powder)
Ni
Molecular mass: 58.7

CAS # 7440-02-0
RTECS # QR5950000
ICSC # 0062
EC # 028-002-00-7

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Flammable as dust. Toxic fumes may be released in a fire.		Water in large amounts, foam, dry sand, NO carbon dioxide.
EXPLOSION	Finely dispersed particles form explosive mixtures in air.	Prevent deposition of dust; closed system, dust explosion-proof electrical equipment and lighting.	
EXPOSURE		PREVENT DISPERSION OF DUST! STRICT HYGIENE!	
• **INHALATION**		Local exhaust or breathing protection.	Fresh air, rest.
• **SKIN**		Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap.
• **EYES**		Safety spectacles or eye protection in combination with breathing protection.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
• **INGESTION**		Do not eat, drink, or smoke during work.	

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING
Vacuum spilled material. Carefully collect remainder, then remove to safe place (extra personal protection: P2 filter respirator for harmful particles).	Separated from strong acids.	Xn symbol R: 40-43 S: (2-)22-36

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0062

International Chemical Safety Cards

NICKEL

ICSC: 0062

IMPORTANT DATA	**PHYSICAL STATE; APPEARANCE:** ODOURLESS SILVERY METALLIC SOLID IN VARIOUS FORMS. **PHYSICAL DANGERS:** Dust explosion possible if in powder or granular form, mixed with air. **CHEMICAL DANGERS:** Reacts violently, in powder form, with titanium powder and potassium perchlorate, and oxidants such as ammonium nitrate, causing fire and explosion hazard. Reacts slowly with non-oxidizing acids and more rapidly with oxidizing acids. Toxic gases and vapours (such as nickel carbonyl) may be released in a fire involving nickel. **OCCUPATIONAL EXPOSURE LIMITS (OELs):** TLV: ppm; 1 mg/m^3 (as TWA) (ACGIH 1993-1994).	**ROUTES OF EXPOSURE:** The substance can be absorbed into the body by inhalation of the dust and by ingestion. **INHALATION RISK:** Evaporation at 20°C is negligible; a harmful concentration of airborne particles can, however, be reached quickly when dispersed. **EFFECTS OF SHORT-TERM EXPOSURE:** Inhalation of the fumes may cause pneumonitis. **EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:** Repeated or prolonged contact with skin may cause dermatitis. Repeated or prolonged contact may cause skin sensitization. Repeated or prolonged inhalation exposure may cause asthma. Lungs may be affected by repeated or prolonged exposure. The substance may have effects on the nasal sinuses , resulting in inflammation and ulceration.
PHYSICAL PROPERTIES	Boiling point: 2730°C Melting point: 1455°C	Relative density (water = 1): 8.9 Solubility in water: none
ENVIRONMENTAL DATA		

NOTES

Depending on the degree of exposure, periodic medical examination is indicated. The symptoms of asthma often do not become manifest until a few hours have passed and they are aggravated by physical effort. Rest and medical observation are therefore essential. Anyone who has shown symptoms of asthma due to this substance should avoid all further contact with this substance.

ADDITIONAL INFORMATION

ICSC: 0062 **NICKEL**

IMPORTANT LEGAL NOTICE:	Neither the CEC or the IPCS nor any person acting on behalf of the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use.

Material Safety Data Sheet

PAH Contaminated Soil

ACC# 17974

Section 1 - Chemical Product and Company Identification

MSDS Name: PAH Contaminated Soil
Catalog Numbers: SRS103100
Synonyms: API separator sludge
Company Identification:
Fisher Scientific
1 Reagent Lane
Fair Lawn, NJ 07410
For information, call: 201-796-7100
Emergency Number: 201-796-7100
For CHEMTREC assistance, call: 800-424-9300
For International CHEMTREC assistance, call: 703-527-3887

Section 2 - Composition, Information on Ingredients

CAS#	Chemical Name	Percent	EINECS/ELINCS
Not available	Soil	78-99	unlisted
120-12-7	Anthracene	0-2	204-371-1
129-00-0	Pyrene	0-2	204-927-3
132-64-9	Dibenzofuran	0-2	205-071-3
205-99-2	Benzo(b)fluoranthene	0-2	205-911-9
206-44-0	Fluoranthene	0-2	205-912-4
208-96-8	Acenaphthylene	0-2	205-917-1
218-01-9	1,2-benzphenanthrene	0-2	205-923-4
50-32-8	Benzo(a)pyrene	0-2	200-028-5
56-55-3	1,2-Benzanthracene	0-2	200-280-6
83-32-9	Acenaphthene	0-2	201-469-6
85-01-8	Phenanthrene	0-2	201-581-5
86-73-7	Fluorene	0-2	201-695-5
87-86-5	Pentachlorophenol	0-2	201-778-6
91-20-3	Naphthalene	0-2	202-049-5
91-57-6	2-methylnaphthalene	0-2	202-078-3

Section 3 - Hazards Identification

EMERGENCY OVERVIEW

Appearance: not available solid.
Warning! May cause allergic skin reaction. Causes eye and skin irritation. May cause cancer based on animal studies.
Target Organs: Eyes, skin.

Potential Health Effects
Eye: May cause eye irritation.
Skin: May cause skin irritation. May cause skin sensitization, an allergic reaction, which becomes evident upon re-exposure to this material.
Ingestion: May cause gastrointestinal irritation with nausea, vomiting and diarrhea. Naphthalene can cause cataracts, optical neuritis, and cornea injuries. Ingestion of large quantities may cause severe hemolytic anemia and
Inhalation: Causes respiratory tract irritation. May cause effects similar to those described for ingestion.
Chronic: May cause cancer according to animal studies. Prolonged exposure to respirable crystalline quartz may cause delayed lung injury/fibrosis (silicosis).

Section 4 - First Aid Measures

Eyes: Immediately flush eyes with plenty of water for at least 15 minutes, occasionally lifting the upper and lower eyelids. Get medical aid.
Skin: Immediately flush skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Get medical aid if irritation develops or persists.
Ingestion: If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid.
Inhalation: Remove from exposure and move to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical aid.
Notes to Physician: Treat symptomatically and supportively.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear.
Extinguishing Media: For small fires, use dry chemical, carbon dioxide, water spray or alcohol-resistant foam.
Flash Point: Not applicable.
Autoignition Temperature: Not applicable.
Explosion Limits, Lower: Not available.
Upper: Not available.
NFPA Rating: Not published.

Section 6 - Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.
Spills/Leaks: Vacuum or sweep up material and place into a suitable disposal container. Avoid generating dusty conditions.

Section 7 - Handling and Storage

Handling: Wash hands before eating. Use with adequate ventilation. Avoid contact with skin and eyes. Keep container tightly closed. Avoid ingestion and inhalation.
Storage: Store in a cool, dry place.

Section 8 - Exposure Controls, Personal Protection

Engineering Controls: Use adequate ventilation to keep airborne concentrations low.
Exposure Limits

Chemical Name	ACGIH	NIOSH	OSHA - Final PELs
Soil	none listed	none listed	none listed
Anthracene	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m3 IDLH (listed under Coal tar pitches).	0.2 mg/m3 TWA (as benzene soluble fraction) (listed under Coal tar pitches).
Pyrene	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m3 IDLH (listed under Coal tar pitches).	0.2 mg/m3 TWA (as benzene soluble fraction) (listed under Coal tar pitches).
Dibenzofuran	none listed	none listed	none listed
Benzo(b)fluoranthene	none listed	none listed	none listed
Fluoranthene	none listed	none listed	none listed
Acenaphthylene	none listed	none listed	none listed
1,2-benzphenanthrene	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m3 IDLH (listed under Coal tar pitches).	0.2 mg/m3 TWA (as benzene soluble fraction) (listed under Coal tar pitches).

Benzo(a)pyrene	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m3 IDLH (listed under Coal tar pitches).	0.2 mg/m3 TWA (as benzene soluble fraction) (listed under Coal tar pitches).
1,2-Benzanthracene	none listed	none listed	none listed
Acenaphthene	none listed	none listed	none listed
Phenanthrene	0.2 mg/m3 TWA (as benzene soluble aerosol) (listed under Coal tar pitches).	0.1 mg/m3 TWA (cyclohexane-extractable fraction) (listed under Coal tar pitches).80 mg/m3 IDLH (listed under Coal tar pitches).	0.2 mg/m3 TWA (as benzene soluble fraction) (listed under Coal tar pitches).
Fluorene	none listed	none listed	none listed
Pentachlorophenol	0.5 mg/m3 TWA; Skin - potential significant contribution to overall exposure by the cutaneous r oute	0.5 mg/m3 TWA 2.5 mg/m3 IDLH	0.5 mg/m3 TWA
Naphthalene	10 ppm TWA; 15 ppm STEL; Skin - potential significant contribution to overall exposure by the cutaneous r oute	10 ppm TWA; 50 mg/m3 TWA 250 ppm IDLH	10 ppm TWA; 50 mg/m3 TWA
2-methylnaphthalene	none listed	none listed	none listed

OSHA Vacated PELs: Soil: No OSHA Vacated PELs are listed for this chemical. Anthracene: No OSHA Vacated PELs are listed for this chemical. Pyrene: No OSHA Vacated PELs are listed for this chemical. Dibenzofuran: No OSHA Vacated PELs are listed for this chemical. Benzo(b)fluoranthene: No OSHA Vacated PELs are listed for this chemical. Fluoranthene: No OSHA Vacated PELs are listed for this chemical. Acenaphthylene: No OSHA Vacated PELs are listed for this chemical. 1,2-benzphenanthrene: No OSHA Vacated PELs are listed for this chemical. Benzo(a)pyrene: No OSHA Vacated PELs are listed for this chemical. 1,2-Benzanthracene: No OSHA Vacated PELs are listed for this chemical. Acenaphthene: No OSHA Vacated PELs are listed for this chemical. Phenanthrene: No OSHA Vacated PELs are listed for this chemical. Fluorene: No OSHA Vacated PELs are listed for this chemical. Pentachlorophenol: 0.5 mg/m3 TWA Naphthalene: 10 ppm TWA; 50 mg/m3 TWA 2-methylnaphthalene: No OSHA Vacated PELs are listed for this chemical.

Personal Protective Equipment

Eyes: Wear appropriate protective eyeglasses or chemical safety goggles as described by OSHA's eye and face protection regulations in 29 CFR 1910.133 or European Standard EN166.

Skin: Wear appropriate gloves to prevent skin exposure.

Clothing: Wear appropriate protective clothing to prevent skin exposure.

Respirators: Follow the OSHA respirator regulations found in 29 CFR 1910.134 or European Standard EN 149. Use a NIOSH/MSHA or European Standard EN 149 approved respirator if exposure limits are exceeded or if irritation or other symptoms are experienced.

Section 9 - Physical and Chemical Properties

Physical State: Solid
Appearance: not available
Odor: none reported
pH: Not available.
Vapor Pressure: Not applicable.
Vapor Density: Not available.
Evaporation Rate: Not applicable.
Viscosity: Not applicable.
Boiling Point: Not available.
Freezing/Melting Point: Not available.
Decomposition Temperature: Not available.
Solubility: Insoluble in water.
Specific Gravity/Density: Not available.
Molecular Formula: Mixture
Molecular Weight: Not available.

Section 10 - Stability and Reactivity

Chemical Stability: Stable under normal temperatures and pressures.
Conditions to Avoid: High temperatures.
Incompatibilities with Other Materials: None reported.
Hazardous Decomposition Products: No data available.
Hazardous Polymerization: Has not been reported.

Section 11 - Toxicological Information

RTECS#:
CAS# 120-12-7: CA9350000
CAS# 129-00-0: UR2450000; UR2450100
CAS# 132-64-9: HP4430000
CAS# 205-99-2: CU1400000
CAS# 206-44-0: LL4025000
CAS# 208-96-8: AB1254000; AB1254200
CAS# 218-01-9: GC0700000
CAS# 50-32-8: DJ3675000
CAS# 56-55-3: CV9275000
CAS# 83-32-9: AB1000000
CAS# 85-01-8: SF7175000
CAS# 86-73-7: LL5670000
CAS# 87-86-5: SM6300000; SM6314000; SM6321000
CAS# 91-20-3: QJ0525000
CAS# 91-57-6: QJ9635000
LD50/LC50:
CAS# 120-12-7:

Oral, mouse: LD50 = 4900 mg/kg;

CAS# 129-00-0:
Draize test, rabbit, skin: 500 mg/24H Mild;
Inhalation, rat: LC50 = 170 mg/m3;
Inhalation, rat: LC50 = 170 mg/m3;
Oral, mouse: LD50 = 800 mg/kg;
Oral, rat: LD50 = 2700 mg/kg;

CAS# 132-64-9:

CAS# 205-99-2:

CAS# 206-44-0:
Oral, rat: LD50 = 2 gm/kg;
Skin, rabbit: LD50 = 3180 mg/kg;

CAS# 208-96-8:
Oral, mouse: LD50 = 1760 mg/kg;

CAS# 218-01-9:

CAS# 50-32-8:

CAS# 56-55-3:

CAS# 83-32-9:

CAS# 85-01-8:
Oral, mouse: LD50 = 700 mg/kg;
Oral, rat: LD50 = 1.8 gm/kg;

CAS# 86-73-7:

CAS# 87-86-5:
Draize test, rabbit, eye: 100 uL/24H Mild;
Inhalation, mouse: LC50 = 225 mg/m3;
Inhalation, mouse: LC50 = 225 mg/m3;
Inhalation, rat: LC50 = 355 mg/m3;
Inhalation, rat: LC50 = 200 mg/m3;
Inhalation, rat: LC50 = 335 mg/m3;
Oral, mouse: LD50 = 36 mg/kg;
Oral, mouse: LD50 = 117 mg/kg;
Oral, mouse: LD50 = 30 mg/kg;
Oral, rabbit: LD50 = 200 mg/kg;
Oral, rat: LD50 = 27 mg/kg;
Oral, rat: LD50 = 27 mg/kg;
Oral, rat: LD50 = 50 mg/kg;
Skin, rat: LD50 = 96

CAS# 91-20-3:
Draize test, rabbit, eye: 100 mg Mild;
Inhalation, rat: LC50 = >340 mg/m3/1H;
Oral, mouse: LD50 = 316 mg/kg;
Oral, rat: LD50 = 490 mg/kg;
Skin, rabbit: LD50 = >20 gm/kg;
Skin, rat: LD50 = >2500 mg/kg;

CAS# 91-57-6:
Oral, rat: LD50 = 1630 mg/kg;

Carcinogenicity:
CAS# 120-12-7:

- **ACGIH:** A1 - Confirmed Human Carcinogen (as benzene soluble aerosol) (listed as 'Coal tar pitches').
- **California:** Not listed.
- **NTP:** Known carcinogen (listed as Coal tar pitches).
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

CAS# 129-00-0:

- **ACGIH:** A1 - Confirmed Human Carcinogen (as benzene soluble aerosol) (listed as 'Coal tar pitches').
- **California:** Not listed.
- **NTP:** Known carcinogen (listed as Coal tar pitches).
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

CAS# 132-64-9: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 205-99-2:

- **ACGIH:** A2 - Suspected Human Carcinogen
- **California:** carcinogen, initial date 7/1/87
- **NTP:** Suspect carcinogen
- **IARC:** Group 2B carcinogen

CAS# 206-44-0: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 208-96-8: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 218-01-9:

- **ACGIH:** A3 - Confirmed animal carcinogen with unknown relevance to humans
- **California:** carcinogen, initial date 1/1/90
- **NTP:** Known carcinogen (listed as Coal tar pitches).
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

CAS# 50-32-8:

- **ACGIH:** A2 - Suspected Human Carcinogen
- **California:** carcinogen, initial date 7/1/87
- **NTP:** Suspect carcinogen
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

CAS# 56-55-3:

- **ACGIH:** A2 - Suspected Human Carcinogen
- **California:** carcinogen, initial date 7/1/87
- **NTP:** Suspect carcinogen
- **IARC:** Group 2A carcinogen

CAS# 83-32-9: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 85-01-8:

- **ACGIH:** A1 - Confirmed Human Carcinogen (as benzene soluble aerosol) (listed as 'Coal tar pitches').

- **California:** Not listed.
- **NTP:** Known carcinogen (listed as Coal tar pitches).
- **IARC:** Group 1 carcinogen (listed as Coal tar pitches).

CAS# 86-73-7: Not listed by ACGIH, IARC, NTP, or CA Prop 65.
CAS# 87-86-5:

- **ACGIH:** A3 - Confirmed animal carcinogen with unknown relevance to humans
- **California:** carcinogen, initial date 1/1/90
- **NTP:** Not listed.
- **IARC:** Not listed.

CAS# 91-20-3:

- **ACGIH:** Not listed.
- **California:** carcinogen, initial date 4/19/02
- **NTP:** Suspect carcinogen
- **IARC:** Group 2B carcinogen

CAS# 91-57-6: Not listed by ACGIH, IARC, NTP, or CA Prop 65.

Epidemiology: No information available.
Teratogenicity: No information available.
Reproductive Effects: No information available.
Mutagenicity: No information available.
Neurotoxicity: No information available.
Other Studies:

Section 12 - Ecological Information

No information available.

Section 13 - Disposal Considerations

Chemical waste generators must determine whether a discarded chemical is classified as a hazardous waste. US EPA guidelines for the classification determination are listed in 40 CFR Parts 261.3. Additionally, waste generators must consult state and local hazardous waste regulations to ensure complete and accurate classification.
RCRA P-Series: None listed.
RCRA U-Series:
CAS# 206-44-0: waste number U120.
CAS# 218-01-9: waste number U050.
CAS# 50-32-8: waste number U022.
CAS# 56-55-3: waste number U018.
CAS# 91-20-3: waste

Section 14 - Transport Information

US DOT	Canada TDG

Shipping Name:	Not regulated as a hazardous material	No information available.
Hazard Class:		
UN Number:		
Packing Group:		

Section 15 - Regulatory Information

US FEDERAL

TSCA

Soil is not listed on the TSCA inventory. It is for research and development use only.
CAS# 120-12-7 is listed on the TSCA inventory.
CAS# 129-00-0 is listed on the TSCA inventory.
CAS# 132-64-9 is listed on the TSCA inventory.
CAS# 205-99-2 is not listed on the TSCA inventory. It is for research and development use only.
CAS# 206-44-0 is listed on the TSCA inventory.
CAS# 208-96-8 is listed on the TSCA inventory.
CAS# 218-01-9 is listed on the TSCA inventory.
CAS# 50-32-8 is listed on the TSCA inventory.
CAS# 56-55-3 is listed on the TSCA inventory.
CAS# 83-32-9 is listed on the TSCA inventory.
CAS# 85-01-8 is listed on the TSCA inventory.
CAS# 86-73-7 is listed on the TSCA inventory.
CAS# 87-86-5 is listed on the TSCA inventory.
CAS# 91-20-3 is listed on the TSCA inventory.
CAS# 91-57-6 is listed on the TSCA inventory.

Health & Safety Reporting List

CAS# 129-00-0: Effective 6/1/87, Sunset 6/1/97 CAS# 91-20-3: Effective 6/1/87, Sunset 6/1/97

Chemical Test Rules

CAS# 91-20-3: Testing required by manufacturers, processors

Section 12b

CAS# 91-20-3: Section 4

TSCA Significant New Use Rule

None of the chemicals in this material have a SNUR under TSCA.

CERCLA Hazardous Substances and corresponding RQs

CAS# 120-12-7: 5000 lb final RQ; 2270 kg final RQ CAS# 129-00-0: 5000 lb final RQ; 2270 kg final RQ CAS# 132-64-9: 100 lb final RQ; 45.4 kg final RQ CAS# 205-99-2: 1 lb final RQ; 0.454 kg final RQ CAS# 206-44-0: 100 lb final RQ; 45.4 kg final RQ CAS# 208-96-8: 5000 lb final RQ; 2270 kg final RQ CAS# 218-01-9: 100 lb final RQ; 45.4 kg final RQ CAS# 50-32-8: 1 lb final RQ; 0.454 kg final RQ CAS# 56-55-3: 10 lb final RQ; 4.54 kg final RQ CAS# 83-32-9: 100 lb final RQ; 45.4 kg final RQ CAS# 85-01-8: 5000 lb final RQ; 2270 kg final RQ CAS# 86-73-7: 5000 lb final RQ; 2270 kg final RQ CAS# 87-86-5: 10 lb final RQ; 4.54 kg final RQ CAS# 91-20-3: 100 lb final RQ; 45.4 kg final RQ

SARA Section 302 Extremely Hazardous Substances

CAS# 129-00-0: 1000 lb TPQ (lower threshold); 10000 lb TPQ (upper thre shold)

SARA Codes

CAS # 120-12-7: acute.
CAS # 129-00-0: acute, chronic.
CAS # 206-44-0: acute.

CAS # 50-32-8: acute, chronic.
CAS # 56-55-3: chronic.
CAS # 83-32-9: acute.
CAS # 85-01-8: acute.
CAS # 91-20-3: acute, chronic, flammable.
CAS # 91-57-6: acute.

Section 313

This material contains Anthracene (CAS# 120-12-7, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

This material contains Dibenzofuran (CAS# 132-64-9, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

This material contains Benzo(b)fluoranthene (CAS# 205-99-2, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

This material contains Fluoranthene (CAS# 206-44-0, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

This material contains 1,2-benzphenanthrene (CAS# 218-01-9, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

This material contains Benzo(a)pyrene (CAS# 50-32-8, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

This material contains 1,2-Benzanthracene (CAS# 56-55-3, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

This material contains Phenanthrene (CAS# 85-01-8, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

This material contains Pentachlorophenol (CAS# 87-86-5, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR

This material contains Naphthalene (CAS# 91-20-3, 0-2%),which is subject to the reporting requirements of Section 313 of SARA Title III and 40 CFR Part 373.

Clean Air Act:

CAS# 132-64-9 is listed as a hazardous air pollutant (HAP).

CAS# 87-86-5 is listed as a hazardous air pollutant (HAP).
CAS# 91-20-3 is listed as a hazardous air pollutant (HAP).

This material does not contain any Class 1 Ozone depletors.
This material does not contain any Class 2 Ozone depletors.

Clean Water Act:

CAS# 87-86-5 is listed as a Hazardous Substance under the CWA. CAS# 91-20-3 is listed as a Hazardous Substance under the CWA. CAS# 120-12-7 is listed as a Priority Pollutant under the Clean Water Act. CAS# 129-00-0 is listed as a Priority Pollutant under the Clean Water Act. CAS# 205-99-2 is listed as a Priority Pollutant under the Clean Water Act.

CAS# 206-44-0 is listed as a Priority Pollutant under the Clean Water Act. CAS# 208-96-8 is listed as a Priority Pollutant under the Clean Water Act. CAS# 218-01-9 is listed as a Priority Pollutant under the Clean Water Act. CAS# 50-32-8 is listed as a Priority Pollutant under the Clean Water Act. CAS# 56-55-3 is listed as a Priority Pollutant under the Clean Water Act. CAS# 83-32-9 is listed as a Priority Pollutant under the Clean Water Act. CAS# 85-01-8 is listed as a Priority Pollutant under the Clean Water Act.

CAS# 86-73-7 is listed as a Priority Pollutant under the Clean Water Act. CAS# 87-86-5 is listed as a Priority Pollutant under the Clean Water Act. CAS# 91-20-3 is listed

as a Priority Pollutant under the Clean Water Act. CAS# 206-44-0 is listed as a Toxic Pollutant under the Clean Water Act. CAS# 83-32-9 is listed as a Toxic Pollutant under the Clean Water Act. CAS# 87-86-5 is listed as a Toxic Pollutant under the Clean Water Act. CAS# 91-20-3 is listed as a Toxic Pollutant under the Clean Water Act.

OSHA:

None of the chemicals in this product are considered highly hazardous by OSHA.

STATE

CAS# 120-12-7 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as Coal tar pitches), Massachusetts.

CAS# 129-00-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as Coal tar pitches), Massachusetts.

CAS# 132-64-9 can be found on the following state right to know lists: New Jersey, Pennsylvania, Massachusetts.

CAS# 205-99-2 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 206-44-0 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Massachusetts.

CAS# 208-96-8 can be found on the following state right to know lists: New Jersey, Pennsylvania, Massachusetts.

CAS# 218-01-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 50-32-8 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 56-55-3 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 83-32-9 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Massachusetts.

CAS# 85-01-8 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, (listed as Coal tar pitches), Massachusetts.

CAS# 86-73-7 can be found on the following state right to know lists: New Jersey, Pennsylvania, Massachusetts.

CAS# 87-86-5 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 91-20-3 can be found on the following state right to know lists: California, New Jersey, Pennsylvania, Minnesota, Massachusetts.

CAS# 91-57-6 is not present on state lists from CA, PA, MN, MA, FL, or NJ.

California Prop 65

WARNING: This product contains Benzo(b)fluoranthene, a chemical known to the state of California to cause cancer. WARNING: This product contains 1,2-benzphenanthrene, a chemical known to the state of California to cause cancer. WARNING: This product contains Benzo(a)pyrene, a chemical known to the state of California to cause cancer. WARNING: This product contains 1,2-Benzanthracene, a chemical known to the state of California to cause cancer. WARNING: This product contains Pentachlorophenol, a chemical known to the state of California to cause cancer. WARNING: This product contains Naphthalene, a chemical known to the state of California to cause cancer.

California No Significant Risk Level: CAS# 205-99-2: 0.096 æg/day NSRL (oral) CAS# 218-01-9: 0.35 æg/day NSRL (oral) CAS# 50-32-8: 0.06 æg/day NSRL CAS# 56-55-3: 0.033 æg/day NSRL (oral) CAS# 87-86-5: 40 æg/day NSRL

European/International Regulations

European Labeling in Accordance with EC Directives

Hazard Symbols:

Not available.

Risk Phrases:

Safety Phrases:

WGK (Water Danger/Protection)

CAS# 120-12-7: 2
CAS# 129-00-0: No information available.
CAS# 132-64-9: No information available.
CAS# 205-99-2: No information available.
CAS# 206-44-0: No information available.
CAS# 208-96-8: No information available.
CAS# 218-01-9: No information available.
CAS# 50-32-8: No information available.
CAS# 56-55-3: No information available.
CAS# 83-32-9: No information available.
CAS# 85-01-8: No information available.
CAS# 86-73-7: No information available.
CAS# 87-86-5: 3
CAS# 91-20-3: 2
CAS# 91-57-6: No information available.

Canada - DSL/NDSL

CAS# 120-12-7 is listed on Canada's DSL List.
CAS# 129-00-0 is listed on Canada's DSL List.
CAS# 132-64-9 is listed on Canada's DSL List.
CAS# 218-01-9 is listed on Canada's DSL List.
CAS# 50-32-8 is listed on Canada's DSL List.
CAS# 83-32-9 is listed on Canada's DSL List.
CAS# 85-01-8 is listed on Canada's DSL List.
CAS# 86-73-7 is listed on Canada's DSL List.
CAS# 87-86-5 is listed on Canada's DSL List.
CAS# 91-20-3 is listed on Canada's DSL List.
CAS# 91-57-6 is listed on Canada's DSL List.
CAS# 206-44-0 is listed on Canada's NDSL List.
CAS# 208-96-8 is listed on Canada's NDSL List.
CAS# 56-55-3 is listed on Canada's NDSL List.

Canada - WHMIS

This product has a WHMIS classification of D2A.

Canadian Ingredient Disclosure List

CAS# 120-12-7 is listed on the Canadian Ingredient Disclosure List.
CAS# 129-00-0 is listed on the Canadian Ingredient Disclosure List.
CAS# 205-99-2 is listed on the Canadian Ingredient Disclosure List.
CAS# 206-44-0 is listed on the Canadian Ingredient Disclosure List.
CAS# 208-96-8 is not listed on the Canadian Ingredient Disclosure List.
CAS# 218-01-9 is listed on the Canadian Ingredient Disclosure List.
CAS# 50-32-8 is listed on the Canadian Ingredient Disclosure List.
CAS# 56-55-3 is listed on the Canadian Ingredient Disclosure List.
CAS# 83-32-9 is listed on the Canadian Ingredient Disclosure List.
CAS# 85-01-8 is listed on the Canadian Ingredient Disclosure List.
CAS# 86-73-7 is not listed on the Canadian Ingredient Disclosure List.
CAS# 87-86-5 is not listed on the Canadian Ingredient Disclosure List.
CAS# 91-20-3 is listed on the Canadian Ingredient Disclosure List.

Section 16 - Additional Information

MSDS Creation Date: 9/02/1997
Revision #3 Date: 3/18/2003

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 Fisher 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 Fisher has been advised of the possibility of such damages.

MATERIAL SAFETY DATA SHEET

Hydrogen Peroxide (40 to 60%)

MSDS Ref. No.: 7722-84-1-4
Date Approved: 02/02/2004
Revision No.: 7

This document has been prepared to meet the requirements of the U.S. OSHA Hazard Communication Standard, 29 CFR 1910.1200; the Canada's Workplace Hazardous Materials Information System (WHMIS) and, the EC Directive, 2001/58/EC.

1. PRODUCT AND COMPANY IDENTIFICATION

PRODUCT NAME: Hydrogen Peroxide (40 to 60%)

ALTERNATE PRODUCT NAME(S): Durox® Reg. & LR 50%, Oxypure® 50%, Semiconductor Reg & Seg 50%, Standard 50%, Technical 50%, Chlorate Grade 50%, Super D® 50%

GENERAL USE:

Durox® 50% Reg. and LR - meets the Food Chemical Codex requirements for aseptic packaging and other food related applications.

Oxypure® 50% - certified by NSF to meet NSF/ANSI Standard 60 requirements for drinking water treatment.

Standard 50% - most suitable for industrial bleaching, processing, pollution abatement and general oxidation reactions.

Semiconductor Reg. & Seg. 50% - conforms to ACS and Semi Specs., for wafer etching and cleaning, and applications requiring low residues.

Super D® 50% - meets US Pharmacopoeia specifications for 3% topical solutions when diluted with proper quality water. While manufactured to the USP standards or purity and to FMC's demanding ISO 9002 quality standards, FMC does not claim that its Hydrogen Peroxide is manufactured in accordance with all pharmaceutical cGMP conditions.

Technical 50% - essentially free of inorganic metals, suitable for chemical synthesis.

Chlorate Grade 50% - specially formulated for use in chlorate manufacture or processing.

SynergOx™ - combination of a proprietary catalyst and 50% hydrogen peroxide, at the point of use, for environmental applications.

MANUFACTURER

FMC CORPORATION
Hydrogen Peroxide Division
1735 Market Street
Philadelphia, PA 19103
(215) 299-6000 (General Information)

FMC of Canada Ltd.
Hydrogen Peroxide Division
PG Pulp Mill Road
Prince George, BC V2N2S6
(250) 561-4200 (General Information)

EMERGENCY TELEPHONE NUMBERS

(800) 424-9300 (CHEMTREC - U.S.)
(613) 996-6666 (CANUTEC)
(303) 595-9048 (Medical - U.S. - Call Collect)

(281) 474-8750 (Plant: Pasadena, TX, US - Call Collect)
(250) 561-4221 (Plant: Prince George, BC, Canada - Call Collect)

2. HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW:

- Clear, colorless, odorless liquid
- Oxidizer.
- Contact with combustibles may cause fire.
- Decomposes yielding oxygen that supports combustion of organic matters and can cause overpressure if confined.
- Corrosive to eyes, nose, throat, lungs and gastrointestinal tract.

POTENTIAL HEALTH EFFECTS: Corrosive to eyes, skin, nose, throat and lungs. May cause irreversible tissue damage to the eyes including blindness.

3. COMPOSITION / INFORMATION ON INGREDIENTS

Chemical Name	CAS#	Wt.%	EC No.	EC Class
Hydrogen Peroxide	7722-84-1	40 - 60	231-765-0	C, R34
Water	7732-18-5	40 - 60	231-791-2	Not classified as hazardous

4. FIRST AID MEASURES

EYES: Immediately flush with water for at least 15 minutes, lifting the upper and lower eyelids intermittently. See a medical doctor or ophthalmologist immediately.

SKIN: Immediately flush with plenty of water while removing contaminated clothing and/or shoes, and thoroughly wash with soap and water. See a medical doctor immediately.

INGESTION: Rinse mouth with water. Dilute by giving 1 or 2 glasses of water. Do not induce vomiting. Never give anything by mouth to an unconscious person. See a medical doctor immediately.

INHALATION: Remove to fresh air. If breathing difficulty or discomfort occurs and persists, contact a medical doctor.

NOTES TO MEDICAL DOCTOR: Hydrogen peroxide at these concentrations is a strong oxidant. Direct contact with the eye is likely to cause corneal damage especially if not washed immediately. Careful ophthalmologic evaluation is recommended and the possibility of local corticosteroid therapy should be considered. Because of the likelihood of corrosive effects on the gastrointestinal tract after ingestion, and the unlikelihood of systemic effects, attempts at evacuating the stomach via emesis induction or gastric lavage should be avoided. There is a remote possibility, however, that a nasogastric or orogastric tube may be required for the reduction of severe distension due to gas formation.

5. FIRE FIGHTING MEASURES

EXTINGUISHING MEDIA: Flood with water.

FIRE / EXPLOSION HAZARDS: Product is non-combustible. On decomposition releases oxygen which may intensify fire.

FIRE FIGHTING PROCEDURES: Any tank or container surrounded by fire should be flooded with water for cooling. Wear full protective clothing and self-contained breathing apparatus.

FLAMMABLE LIMITS: Non-combustible

SENSITIVITY TO IMPACT: No data available

SENSITIVITY TO STATIC DISCHARGE: No data available

6. ACCIDENTAL RELEASE MEASURES

RELEASE NOTES: Dilute with a large volume of water and hold in a pond or diked area until hydrogen peroxide decomposes. Hydrogen peroxide may be decomposed by adding sodium metabisulfite or sodium sulfite after diluting to about 5%. Dispose according to methods outlined for waste disposal.

Combustible materials exposed to hydrogen peroxide should be immediately submerged in or rinsed with large amounts of water to ensure that all hydrogen peroxide is removed. Residual hydrogen peroxide that is allowed to dry (upon evaporation hydrogen peroxide can concentrate) on organic materials such as paper, fabrics, cotton, leather, wood or other combustibles can cause the material to ignite and result in a fire.

7. HANDLING AND STORAGE

HANDLING: Wear chemical splash-type monogoggles and full-face shield, impervious clothing, such as rubber, PVC, etc., and rubber or neoprene gloves and shoes. Avoid cotton, wool and leather. Avoid excessive heat and contamination. Contamination may cause decomposition and generation of oxygen gas which could result in high pressures and possible container rupture. Hydrogen peroxide should be stored only in vented containers and transferred only in a prescribed manner (see FMC Technical Bulletins). Never return unused hydrogen peroxide to original container, empty drums should be triple rinsed with water before discarding. Utensils used for handling hydrogen peroxide should only be made of glass, stainless steel, aluminum or plastic.

STORAGE: Store drums in cool areas out of direct sunlight and away from combustibles. For bulk storage refer to FMC Technical Bulletins.

COMMENTS: VENTILATION: Provide mechanical general and/or local exhaust ventilation to prevent release of vapor or mist into the work environment.

8. EXPOSURE CONTROLS / PERSONAL PROTECTION

EXPOSURE LIMITS

Chemical Name	ACGIH	OSHA	Supplier
Hydrogen Peroxide	1 ppm (TWA)	1 ppm (PEL)	

ENGINEERING CONTROLS: Ventilation should be provided to minimize the release of hydrogen peroxide vapors and mists into the work environment. Spills should be minimized or confined immediately to prevent release into the work area. Remove contaminated clothing immediately and wash before reuse.

PERSONAL PROTECTIVE EQUIPMENT

EYES AND FACE: Use chemical splash-type monogoggles and a full-face shield made of polycarbonate, acetate, polycarbonate/acetate, PETG or thermoplastic.

RESPIRATORY: If concentrations in excess of 10 ppm are expected, use NIOSH/DHHS approved self-contained breathing apparatus (SCBA), or other approved atmospheric-supplied respirator (ASR) equipment (e.g., a full-face airline respirator (ALR)). DO NOT use any form of air-purifying respirator (APR) or filtering facepiece (AKA dust mask), especially those containing oxidizable sorbants such as activated carbon.

PROTECTIVE CLOTHING: For body protection wear impervious clothing such as an approved splash protective suit made of SBR Rubber, PVC (PVC Outershell w/Polyester Substrate), Gore-Tex (Polyester trilaminate w/Gore-Tex), or a specialized HAZMAT Splash or Protective Suite (Level A, B, or C). For foot protection, wear approved boots made of NBR, PVC, Polyurethane, or neoprene. Overboots made of Latex or PVC, as well as firefighter boots or specialized HAZMAT boots are also permitted. DO NOT wear any form of boot or overboots made of nylon or nylon blends. DO NOT use cotton, wool or leather, as these materials react RAPIDLY with higher concentrations of hydrogen peroxide. Completely submerge hydrogen peroxide contaminated clothing or other materials in water prior to drying. Residual hydrogen peroxide, if allowed to dry on materials such as paper, fabrics, cotton, leather, wood or other combustibles can cause the material to ignite and result in a fire.

GLOVES: For hand protection, wear approved gloves made of nitrile, PVC, or neoprene. DO NOT use cotton, wool or leather for these materials react RAPIDLY with higher concentrations of hydrogen peroxide. Thoroughly rinse the outside of gloves with water prior to removal. Inspect regularly for leaks.

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9. PHYSICAL AND CHEMICAL PROPERTIES

ODOR:	Odorless
APPEARANCE:	Clear, colorless liquid
AUTOIGNITION TEMPERATURE:	Non-combustible
BOILING POINT:	110°C (229°F) (40%); 114°C (237°F) (50%)
COEFFICIENT OF OIL / WATER:	Not available
DENSITY / WEIGHT PER VOLUME:	Not available
EVAPORATION RATE:	Above 1 (Butyl Acetate = 1)
FLASH POINT:	Non-combustible
FREEZING POINT:	-41.4°C (-42.5°F) (40%); -52°C (-62°F) (50%)
ODOR THRESHOLD:	Not available
OXIDIZING PROPERTIES:	Strong oxidizer
PERCENT VOLATILE:	100%
pH:	(as is) 1.0 to 3.0
SOLUBILITY IN WATER:	(in H_2O % by wt) 100%

SPECIFIC GRAVITY:	(H_20 = 1) 1.15 @ 20°C/4°C (40%); 1.19 @ 20°C/4°C (50%)
VAPOR DENSITY:	Not available (Air = 1)
VAPOR PRESSURE:	22 mmHg @ 30°C (40%); 18.3 mmHg @ 30°C (50%)

COMMENTS:
pH (1% solution) : 5.0 - 6.0

10. STABILITY AND REACTIVITY

CONDITIONS TO AVOID:	Excessive heat or contamination could cause product to become unstable.
STABILITY:	Stable (heat and contamination could cause decomposition)
POLYMERIZATION:	Will not occur
INCOMPATIBLE MATERIALS:	Reducing agents, wood, paper and other combustibles, iron and other heavy metals, copper alloys and caustic.
HAZARDOUS DECOMPOSITION PRODUCTS:	Oxygen which supports combustion.

COMMENTS: Materials to Avoid : Dirt, organics, cyanides and combustibles such as wood, paper, oils, etc.

11. TOXICOLOGICAL INFORMATION

EYE EFFECTS: 70% hydrogen peroxide: Severe irritant (corrosive) (rabbit) [FMC Study Number: ICG/T-79.027]

SKIN EFFECTS: 50% hydrogen peroxide: Severe irritant (corrosive) (rabbit) [FMC Study Number: I89-1079]

DERMAL LD_{50}: 70% hydrogen peroxide: > 6.5 g/kg (rabbit) [FMC Study Number: ICG/T-79.027]

ORAL LD_{50}: 50% hydrogen peroxide: > 225 mg/kg (rat) [FMC Study Number: I86-914]

INHALATION LC_{50}: 50% hydrogen peroxide: > 0.17 mg/l (rat) [FMC Study Number: I89-1080]

TARGET ORGANS: Eye, skin, nose, throat, lungs

ACUTE EFFECTS FROM OVEREXPOSURE: Severe irritant/corrosive to eyes, skin and gastrointestinal tract. May cause irreversible tissue damage to the eyes including blindness. Inhalation of mist or vapors may be severely irritating to nose, throat and lungs.

CHRONIC EFFECTS FROM OVEREXPOSURE: The International Agency for Research on Cancer (IARC) has concluded that there is inadequate evidence for carcinogenicity of hydrogen peroxide in humans, but limited evidence in experimental animals (Group 3 - not classifiable as to its carcinogenicity to humans). The American Conference of Governmental Industrial Hygienists (ACGIH) has concluded that hydrogen peroxide is a 'Confirmed Animal Carcinogen with Unknown Relevance to Humans' (A3).

CARCINOGENICITY:

Chemical Name	IARC	NTP	OSHA	Other
Hydrogen Peroxide	Listed	Not listed	Not listed	(ACGIH) Listed (A3, Animal Carcinogen)

12. ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION: Channel catfish 96-hour LC_{50} = 37.4 mg/L
Fathead minnow 96-hour LC_{50} = 16.4 mg/L
Daphnia magna 24-hour EC_{50} = 7.7 mg/L
Daphnia pulex 48-hour LC_{50} = 2.4 mg/L
Freshwater snail 96-hour LC_{50} = 17.7 mg/L
For more information refer to ECETOC "Joint Assessment of Commodity Chemicals No. 22, Hydrogen Peroxide." ISSN-0773-6339, January 1993

CHEMICAL FATE INFORMATION: Hydrogen peroxide in the aquatic environment is subject to various reduction or oxidation processes and decomposes into water and oxygen. Hydrogen peroxide half-life in freshwater ranged from 8 hours to 20 days, in air from 10-20 hrs. and in soils from minutes to hours depending upon microbiological activity and metal contaminants.

13. DISPOSAL CONSIDERATIONS

DISPOSAL METHOD: An acceptable method of disposal is to dilute with a large amount of water and allow the hydrogen peroxide to decompose followed by discharge into a suitable treatment system in accordance with all regulatory agencies. The appropriate regulatory agencies should be contacted prior to disposal.

14. TRANSPORT INFORMATION

U.S. DEPARTMENT OF TRANSPORTATION (DOT)

PROPER SHIPPING NAME:	Hydrogen peroxide, aqueous solutions with more than 40% but not more than 60% hydrogen peroxide.
PRIMARY HAZARD CLASS / DIVISION:	5.1 (Oxidizer)
UN/NA NUMBER:	UN 2014
PACKING GROUP:	II
LABEL(S):	Oxidizer, Corrosive
PLACARD(S):	5.1 (Oxidizer)
ADDITIONAL INFORMATION:	DOT Marking: Hydrogen Peroxide, aqueous solution with more than 40%, but not more than 60% Hydrogen Peroxide, UN 2014 Hazardous Substance/RQ: Not applicable 49 STCC Number: 4918775 DOT Spec: stainless steel/high purity aluminum cargo tanks and rail cars. UN Spec: HDPE drums. Contact FMC for specific details.

INTERNATIONAL MARITIME DANGEROUS GOODS (IMDG)

PROPER SHIPPING NAME:	Hydrogen peroxide, aqueous solutions with not less than 20%, but not more than 60% hydrogen peroxide.

INTERNATIONAL CIVIL AVIATION ORGANIZATION (ICAO) / INTERNATIONAL AIR TRANSPORT ASSOCIATION (IATA)

PROPER SHIPPING NAME:	Hydrogen peroxide (40 - 60%) is forbidden on Passenger and Cargo Aircraft, as well as Cargo Only Aircraft.

OTHER INFORMATION:

Protect from physical damage. Keep drums in upright position. Drums should not be stacked in transit. Do not store drum on wooden pallets.

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15. REGULATORY INFORMATION

UNITED STATES

SARA TITLE III (SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT)

SECTION 302 EXTREMELY HAZARDOUS SUBSTANCES (40 CFR 355, APPENDIX A):

Hydrogen Peroxide > 52%, RQ: 1000 lbs. Planning Threshold: 10,000 lbs.

SECTION 311 HAZARD CATEGORIES (40 CFR 370):
Fire Hazard, Immediate (Acute) Health Hazard

SECTION 312 THRESHOLD PLANNING QUANTITY (40 CFR 370):
The Threshold Planning Quantity (TPQ) for this product, if treated as a mixture, is 10,000 lbs; however, this product contains the following ingredients with a TPQ of less than 10,000 lbs.: None, (conc. <52%) (hydrogen peroxide, 1000 lbs. when conc is >52%)

SECTION 313 REPORTABLE INGREDIENTS (40 CFR 372):
Not listed

CERCLA (COMPREHENSIVE ENVIRONMENTAL RESPONSE COMPENSATION AND LIABILITY ACT)

CERCLA DESIGNATION & REPORTABLE QUANTITIES (RQ) (40 CFR 302.4):
Unlisted (Hydrogen Peroxide); RQ = 100 lbs.; Ignitability, Corrosivity

TSCA (TOXIC SUBSTANCE CONTROL ACT)

TSCA INVENTORY STATUS (40 CFR 710):
Listed

RESOURCE CONSERVATION AND RECOVERY ACT (RCRA)
RCRA IDENTIFICATION OF HAZARDOUS WASTE (40 CFR 261):
Waste Number: D001, D002

CANADA

WHMIS (WORKPLACE HAZARDOUS MATERIALS INFORMATION SYSTEM):

Product Identification Number:	2014
Hazard Classification / Division:	Class C (Oxidizer), Class D, Div. 2, Subdiv. B (Toxic), Class E (Corrosive)
Ingredient Disclosure List:	Listed

EU EINECS NUMBERS:

008-003-00-9 (hydrogen peroxide)

INTERNATIONAL LISTINGS

Hydrogen peroxide:
China: Listed
Japan (ENCS): (1)-419
Korea: KE-20204
Philippines (PICCS): Listed

16. OTHER INFORMATION

HAZARD, RISK AND SAFETY PHRASE DESCRIPTIONS:

Hydrogen Peroxide:

EC Symbols:	C	(Corrosive)
EC Risk Phrases:	R34	(Causes burns)
EC Safety Phrases:	S1/2	(Keep locked up and out of reach of children.)
	S3	(Keep in a cool place.)
	S28	(After contact with skin, wash immediately with plenty of water and soap.)
	S36/39	(Wear suitable protective clothing. Wear eye / face protection.)
	S45	(In case of accident or if you feel unwell, seek medical advice immediately - show the label where possible.)

HMIS

Health	3
Flammability	0
Physical Hazard	1
Personal Protection (PPE)	H

Protection = H (Safety goggles, gloves, apron, the use of a supplied air or SCBA respirator is required in lieu of a vapor cartridge respirator)

HMIS = Hazardous Materials Identification System

Degree of Hazard Code:
4 = Severe
3 = Serious
2 = Moderate
1 = Slight
0 = Minimal

NFPA

Health	3
Flammability	0
Reactivity	1
Special	OX

SPECIAL = OX (Oxidizer)

NFPA = National Fire Protection Association

Degree of Hazard Code:
4 = Extreme
3 = High
2 = Moderate

1 = Slight
0 = Insignificant

REVISION SUMMARY:
Changes in information are as follows:
New Format, as well as text changes and/or updates to one or more Sections of this MSDS.

Durox, Oxypure, Super D, SynergOx and FMC Logo - FMC Trademarks

NOTE: NFPA Reactivity is 3 - when greater than 52%

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3 PCB

International Chemical Safety Cards

POLYCHLORINATED BIPHENYL (AROCLOR 1254)

ICSC: 0939

Chlorobiphenyl (54% chlorine)
Chlorodiphenyl (54% chlorine)
PCB
Molecular mass: 327 (average)

ICSC # 0939
CAS # 11097-69-1
RTECS # TQ1360000
UN # 2315
EC # 602-039-00-4

TYPES OF HAZARD/ EXPOSURE	ACUTE HAZARDS/ SYMPTOMS	PREVENTION	FIRST AID/ FIRE FIGHTING
FIRE	Not combustible. Gives off irritating or toxic fumes (or gases) in a fire.		Powder, carbon dioxide.
EXPLOSION			
EXPOSURE		PREVENT GENERATION OF MISTS! STRICT HYGIENE!	
•INHALATION		Ventilation.	Fresh air, rest. Refer for medical attention.
•SKIN	MAY BE ABSORBED! Dry skin. Redness.	Protective gloves. Protective clothing.	Remove contaminated clothes. Rinse and then wash skin with water and soap. Refer for medical attention.
•EYES		Safety goggles, face shield.	First rinse with plenty of water for several minutes (remove contact lenses if easily possible), then take to a doctor.
•INGESTION	Headache. Numbness.	Do not eat, drink, or smoke during work.	Rest. Refer for medical attention.

SPILLAGE DISPOSAL	STORAGE	PACKAGING & LABELLING

Consult an expert! Collect leaking liquid in sealable containers. Absorb remaining liquid in sand or inert absorbent and remove to safe place. Do NOT let this chemical enter the environment. (Extra personal protection: complete protective clothing including self-contained breathing apparatus).	Separated from food and feedstuffs. Cool. Dry. Keep in a well-ventilated room.	Unbreakable packaging; put breakable packaging into closed unbreakable container. Do not transport with food and feedstuffs. Severe marine pollutant. Note: C Xn symbol R: 33-50/53 S: 2-35-60-61 UN Hazard Class: 9 UN Packing Group: II

SEE IMPORTANT INFORMATION ON BACK

ICSC: 0939

Prepared in the context of cooperation between the International Programme on Chemical Safety & the Commission of the European Communities (C) IPCS CEC 2000. No modifications to the International version have been made except to add the OSHA PELs, NIOSH RELs and NIOSH IDLH values.

International Chemical Safety Cards

POLYCHLORINATED BIPHENYL (AROCLOR 1254)

ICSC: 0939

IMPORTANT DATA

PHYSICAL STATE; APPEARANCE:
LIGHT YELLOW VISCOUS LIQUID.

PHYSICAL DANGERS:

CHEMICAL DANGERS:
The substance decomposes in a fire producing irritating and toxic gases.

OCCUPATIONAL EXPOSURE LIMITS:
TLV: ppm; 0.5 mg/m^3 A3 (skin) (ACGIH 1999).
OSHA PEL: TWA 0.5 mg/m^3 skin
NIOSH REL: Ca TWA 0.001 mg/m^3 See Appendix A *Note: The REL also applies to other PCBs.
NIOSH IDLH: Potential occupational carcinogen 5 mg/m^3

ROUTES OF EXPOSURE:
The substance can be absorbed into the body by inhalation of its aerosol, through the skin and by ingestion.

INHALATION RISK:
A harmful contamination of the air will be reached rather slowly on evaporation of this substance at 20°C.

EFFECTS OF SHORT-TERM EXPOSURE:

EFFECTS OF LONG-TERM OR REPEATED EXPOSURE:
Repeated or prolonged contact with skin may cause dermatitis. The substance may have effects on the liver. Animal tests show that this substance possibly causes toxic effects upon human reproduction.

PHYSICAL PROPERTIES

Relative density (water = 1): 1.5
Solubility in water: none

Vapour pressure, Pa at 25°C: 0.01
Octanol/water partition coefficient as log

	Pow: 6.30 (estimated)
ENVIRONMENTAL DATA	In the food chain important to humans, bioaccumulation takes place, specifically in water organisms. It is strongly advised not to let the chemical enter into the environment. 

N O T E S

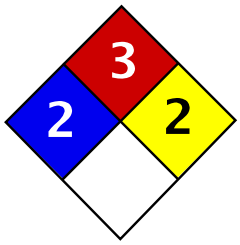
Changes into a resinous state (pour point) at 10°C. Distillation range: 365°-390°C.

Transport Emergency Card: TEC (R)-914

ADDITIONAL INFORMATION

ICSC: 0939 **POLYCHLORINATED BIPHENYL (AROCLOR 1254)**

IMPORTANT LEGAL NOTICE:	Neither NIOSH, the CEC or the IPCS nor any person acting on behalf of NIOSH, the CEC or the IPCS is responsible for the use which might be made of this information. This card contains the collective views of the IPCS Peer Review Committee and may not reflect in all cases all the detailed requirements included in national legislation on the subject. The user should verify compliance of the cards with the relevant legislation in the country of use. The only modifications made to produce the U.S. version is inclusion of the OSHA PELs, NIOSH RELs and NIOSH IDLH values.



Health	2
Fire	3
Reactivity	0
Personal Protection	H

Material Safety Data Sheet
Styrene (monomer) MSDS

Section 1: Chemical Product and Company Identification

Product Name: Styrene (monomer)

Catalog Codes: SLS2512, SLU1027

CAS#: 100-42-5

RTECS: WL3675000

TSCA: TSCA 8(b) inventory: Styrene (monomer)

CI#: Not available.

Synonym: Vinylbenzene

Chemical Formula: C8H8

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
Styrene (monomer)	100-42-5	100

Toxicological Data on Ingredients: Styrene (monomer): ORAL (LD50): Acute: 2650 mg/kg [Rat]. 316 mg/kg [Mouse]. VAPOR (LC50): Acute: 12000 ppm 4 hour(s) [Rat]. 9500 ppm 4 hour(s) [Mouse].

Section 3: Hazards Identification

Potential Acute Health Effects:
Very hazardous in case of eye contact (irritant). Hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation. Inflammation of the eye is characterized by redness, watering, and itching.

Potential Chronic Health Effects:
CARCINOGENIC EFFECTS: Classified + (PROVEN) by OSHA. Classified 2B (Possible for human.) by IARC. A4 (Not classifiable for human or animal.) by ACGIH.
MUTAGENIC EFFECTS: Not available.
TERATOGENIC EFFECTS: Not available.
DEVELOPMENTAL TOXICITY: Not available.
The substance is toxic to the nervous system, upper respiratory tract.
Repeated or prolonged exposure to the substance can produce target organs damage.

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:
Wash with a disinfectant soap and cover the contaminated skin with an anti-bacterial cream. Seek immediate medical attention.

Inhalation: Allow the victim to rest in a well ventilated area. Seek immediate medical attention.

Serious Inhalation: Not available.

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: 490°C (914°F)

Flash Points: CLOSED CUP: 31.1°C (88°F). (Cleveland) OPEN CUP: 36.7°C (98.1°F) (TAG).

Flammable Limits: LOWER: 1.1% UPPER: 6.1%

Products of Combustion: These products are carbon oxides (CO, CO2).

Fire Hazards in Presence of Various Substances:
Flammable in presence of open flames and sparks.
Slightly flammable to flammable in presence of heat.

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 liquid, soluble or dispersed in water.
SMALL FIRE: Use DRY chemical powder.
LARGE FIRE: Use alcohol foam, 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: Absorb with an inert material and put the spilled material in an appropriate waste disposal.

Large Spill:
Flammable liquid.
Keep away from heat. Keep away from sources of ignition. Stop leak if without risk. Absorb with DRY earth, sand or other non-combustible material. Do not touch spilled material. Prevent entry into sewers, basements or confined areas; dike if needed. Eliminate all ignition sources. 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 gas/fumes/ vapour/spray. 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

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. A refrigerated room would be preferable for materials with a flash point lower than 37.8°C (100°F).

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:
Splash goggles. Lab coat. Vapor 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 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:
TWA: 50 STEL: 100 (ppm)
TWA: 213 STEL: 426 (mg/m3)
Consult local authorities for acceptable exposure limits.

Section 9: Physical and Chemical Properties

Physical state and appearance: Liquid. (Clear viscous liquid.)

Odor: Sweetish. Aromatic.

Taste: Not available.

Molecular Weight: 104.14 g/mole

Color: Colorless.

pH (1% soln/water): Not available.

Boiling Point: 145.2°C (293.4°F)

Melting Point: -30.6°C (-23.1°F)

Critical Temperature: Not available.

Specific Gravity: 0.906 (Water = 1)

Vapor Pressure: 4.5 mm of Hg (@ 20°C)

Vapor Density: 3.59 (Air = 1)

Volatility: Not available.

Odor Threshold: 0.1 ppm

Water/Oil Dist. Coeff.: The product is equally soluble in oil and water; log(oil/water) = 0

Ionicity (in Water): Not available.

Dispersion Properties: Not available.

Solubility: Very slightly soluble in cold 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: Not available.

Corrosivity: Non-corrosive in presence of glass.

Special Remarks on Reactivity: Not available.

Special Remarks on Corrosivity: Not available.

Polymerization: No.

Section 11: Toxicological Information

Routes of Entry: 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): 316 mg/kg [Mouse].
Acute toxicity of the vapor (LC50): 9500 ppm 4 hour(s) [Mouse].

Chronic Effects on Humans:
CARCINOGENIC EFFECTS: Classified + (PROVEN) by OSHA. Classified 2B (Possible for human.) by IARC.
A4 (Not classifiable for human or animal.) by ACGIH.
The substance is toxic to the nervous system, upper respiratory tract.

Other Toxic Effects on Humans: Hazardous in case of skin contact (irritant, permeator), of ingestion, of inhalation.

Special Remarks on Toxicity to Animals: Not available.

Special Remarks on Chronic Effects on Humans:

Animal embryotoxic. Postnatal development injury in animal. Menstrual disorders in human. Human: passes the placental barrier, detected in maternal milk.

Special Remarks on other Toxic Effects on Humans: Not available.

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 more toxic.

Special Remarks on the Products of Biodegradation: Not available.

Section 13: Disposal Considerations

Waste Disposal:

Section 14: Transport Information

DOT Classification: Class 3: Flammable liquid.

Identification: : Styrene monomer, inhibited : UN2055 PG: III

Special Provisions for Transport: Marine Pollutant

Section 15: Other Regulatory Information

Federal and State Regulations:
Pennsylvania RTK: Styrene (monomer)
Florida: Styrene (monomer)
Minnesota: Styrene (monomer)
Massachusetts RTK: Styrene (monomer)
New Jersey: Styrene (monomer)
TSCA 8(b) inventory: Styrene (monomer)
SARA 313 toxic chemical notification and release reporting: Styrene (monomer)
CERCLA: Hazardous substances.: Styrene (monomer)

Other Regulations: OSHA: Hazardous by definition of Hazard Communication Standard (29 CFR 1910.1200).

Other Classifications:

WHMIS (Canada):
CLASS B-2: Flammable liquid with a flash point lower than 37.8°C (100°F).
CLASS D-2A: Material causing other toxic effects (VERY TOXIC).

DSCL (EEC):
R10- Flammable.
R38- Irritating to skin.
R41- Risk of serious damage to eyes.
R45- May cause cancer.

HMIS (U.S.A.):

Health Hazard: 2

Fire Hazard: 3

Reactivity: 0

Personal Protection: h

National Fire Protection Association (U.S.A.):

Health: 2

Flammability: 3

Reactivity: 2

Specific hazard:

Protective Equipment:
Gloves.
Lab coat.
Vapor 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: 10/09/2005 06:40 PM

Last Updated: 10/09/2005 06:40 PM

MSDS Number: **T3913** * * * * * *Effective Date:* ***10/05/06*** * * * * * *Supercedes:* ***08/03/04***

MSDS Material Safety Data Sheet

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

Mallinckrodt CHEMICALS J.T.Baker

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

National Response in Canada
CANUTEC: 613-996-6666

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

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

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

TOLUENE

1. Product Identification

Synonyms: Methylbenzene; Toluol; Phenylmethane
CAS No.: 108-88-3
Molecular Weight: 92.14
Chemical Formula: C6H5-CH3
Product Codes:
J.T. Baker: 5375, 5812, 9336, 9351, 9364, 9456, 9457, 9459, 9460, 9462, 9466, 9472, 9476
Mallinckrodt: 4483, 8092, 8604, 8608, 8610, 8611, V560

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Toluene	108-88-3	100%	Yes

3. Hazards Identification

Emergency Overview

POISON! DANGER! HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. VAPOR HARMFUL. FLAMMABLE LIQUID AND VAPOR. MAY AFFECT LIVER, KIDNEYS, BLOOD SYSTEM, OR CENTRAL NERVOUS SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.

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

Health Rating: 2 - Moderate (Life)
Flammability Rating: 3 - Severe (Flammable)
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe (Life)
Lab Protective Equip: GOGGLES & SHIELD; LAB COAT & APRON; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Inhalation may cause irritation of the upper respiratory tract. Symptoms of overexposure may include fatigue, confusion, headache, dizziness and drowsiness. Peculiar skin sensations (e. g. pins and needles) or numbness may be produced. Very high concentrations may cause unconsciousness and death.
Ingestion:
Swallowing may cause abdominal spasms and other symptoms that parallel over-exposure from inhalation. Aspiration of material into the lungs can cause chemical pneumonitis, which may be fatal.
Skin Contact:
Causes irritation. May be absorbed through skin.
Eye Contact:
Causes severe eye irritation with redness and pain.
Chronic Exposure:
Reports of chronic poisoning describe anemia, decreased blood cell count and bone marrow hypoplasia. Liver and kidney damage may occur. Repeated or prolonged contact has a defatting action, causing drying, redness, dermatitis. Exposure to toluene may affect the developing fetus.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or impaired liver or kidney function may be more susceptible to the effects of this substance. Alcoholic beverage consumption can enhance the toxic effects of this substance.

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4. First Aid Measures

Inhalation:
If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. CALL A PHYSICIAN IMMEDIATELY.
Ingestion:
Aspiration hazard. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. Get medical attention immediately. If vomiting occurs, keep head below hips to prevent aspiration into lungs.
Skin Contact:
In case of contact, immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Call a physician immediately.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

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5. Fire Fighting Measures

Fire:
Flash point: 7C (45F) CC
Autoignition temperature: 422C (792F)
Flammable limits in air % by volume:
lel: 1.1; uel: 7.1
Flammable liquid and vapor!
Dangerous fire hazard when exposed to heat or flame. Vapors can flow along surfaces to distant ignition source and flash back.
Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Contact with strong oxidizers may cause fire or explosion. Sensitive to static discharge.
Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Water may be used to flush spills away from exposures and to dilute spills to non-flammable mixtures.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full

facepiece operated in the pressure demand or other positive pressure mode. Water spray may be used to keep fire exposed containers cool.

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
Toluene:
- OSHA Permissible Exposure Limit (PEL):
200 ppm (TWA); 300 ppm (acceptable ceiling conc.); 500 ppm (maximum conc.).
- ACGIH Threshold Limit Value (TLV):
50 ppm (TWA) skin, A4 - Not Classifiable as a Human Carcinogen.

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a half-face organic vapor respirator may be worn for up to ten times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.

Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Clear, colorless liquid.
Odor:
Aromatic benzene-like.
Solubility:
0.05 gm/100gm water @ 20C (68F).
Specific Gravity:
0.86 @ 20C / 4 C
pH:
No information found.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
111C (232F)
Melting Point:
-95C (-139F)
Vapor Density (Air=1):
3.14
Vapor Pressure (mm Hg):
22 @ 20C (68F)
Evaporation Rate (BuAc=1):
2.24

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10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Containers may burst when heated.
Hazardous Decomposition Products:
Carbon dioxide and carbon monoxide may form when heated to decomposition.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Heat, flame, strong oxidizers, nitric and sulfuric acids, chlorine, nitrogen tetraoxide; will attack some forms of plastics, rubber, coatings.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

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11. Toxicological Information

Toxicological Data:
Oral rat LD50: 636 mg/kg; skin rabbit LD50: 14100 uL/kg; inhalation rat LC50: 49 gm/m3/4H; Irritation data: skin rabbit, 500 mg, Moderate; eye rabbit, 2 mg/24H, Severe. Investigated as a tumorigen, mutagen, reproductive effector.
Reproductive Toxicity:
Has shown some evidence of reproductive effects in laboratory animals.

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

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Toluene (108-88-3)	No	No	3

---

12. Ecological Information

Environmental Fate:
When released into the soil, this material may evaporate to a moderate extent. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released into water, this material may evaporate to a moderate extent. When released into water, this material may biodegrade to a moderate extent. When released into the air, this material may be moderately degraded by reaction

with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of less than 1 day. This material is not expected to significantly bioaccumulate. This material has a log octanol-water partition coefficient of less than 3.0. Bioconcentration factor = 13.2 (eels).
Environmental Toxicity:
This material is expected to be toxic to aquatic life. The LC50/96-hour values for fish are between 10 and 100 mg/l.

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13. Disposal Considerations

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

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14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: TOLUENE
Hazard Class: 3
UN/NA: UN1294
Packing Group: II
Information reported for product/size: 390LB

International (Water, I.M.O.)

Proper Shipping Name: TOLUENE
Hazard Class: 3
UN/NA: UN1294
Packing Group: II
Information reported for product/size: 390LB

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15. Regulatory Information

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

Ingredient	TSCA	EC	Japan	Australia
Toluene (108-88-3)	Yes	Yes	Yes	Yes

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

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Toluene (108-88-3)	Yes	Yes	No	Yes

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

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Toluene (108-88-3)	No	No	Yes	No

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

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Toluene (108-88-3)	1000	U220	No

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

WARNING:

THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

Australian Hazchem Code: 3[Y]E
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

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16. Other Information

NFPA Ratings: Health: **2** Flammability: **3** Reactivity: **0**
Label Hazard Warning:
POISON! DANGER! HARMFUL OR FATAL IF SWALLOWED. HARMFUL IF INHALED OR ABSORBED THROUGH SKIN. VAPOR HARMFUL. FLAMMABLE LIQUID AND VAPOR. MAY AFFECT LIVER, KIDNEYS, BLOOD SYSTEM, OR CENTRAL NERVOUS SYSTEM. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT.
Label Precautions:
Keep away from heat, sparks and flame.
Keep container closed.
Use only with adequate ventilation.
Wash thoroughly after handling.
Avoid breathing vapor.
Avoid contact with eyes, skin and clothing.
Label First Aid:
Aspiration hazard. If swallowed, DO NOT INDUCE VOMITING. Give large quantities of water. Never give anything by mouth to an unconscious person. If vomiting occurs, keep head below hips to prevent aspiration into lungs. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Wash clothing before reuse. In all cases call a physician immediately.
Product Use:
Laboratory Reagent.
Revision Information:
MSDS Section(s) changed since last revision of document include: 5.
Disclaimer:
****

Mallinckrodt Baker, Inc. provides the information contained herein in good faith but makes no representation as to its comprehensiveness or accuracy. This document is intended only as a guide to the appropriate precautionary handling of the material by a properly trained person using this product. Individuals receiving the information must exercise their independent judgment in determining its appropriateness for a particular purpose. MALLINCKRODT BAKER, INC. MAKES NO REPRESENTATIONS OR WARRANTIES, EITHER EXPRESS OR IMPLIED, INCLUDING WITHOUT LIMITATION ANY WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE WITH RESPECT TO THE INFORMATION SET FORTH HEREIN OR THE PRODUCT TO WHICH THE INFORMATION REFERS. ACCORDINGLY, MALLINCKRODT BAKER, INC. WILL NOT BE RESPONSIBLE FOR DAMAGES RESULTING FROM USE OF OR RELIANCE UPON THIS INFORMATION.
****

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

MSDS Number: **X2000** * * * * * *Effective Date:* ***02/16/06*** * * * * * *Supercedes:* ***04/01/03***

MSDS Material Safety Data Sheet

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

Mallinckrodt CHEMICALS | J.T.Baker

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

National Response in Canada
CANUTEC: 613-996-6666

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

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

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

XYLENES

1. Product Identification

Synonyms: Dimethyl benzene, xylol, methyltoluene
CAS No.: 1330-20-7
Molecular Weight: 106.17
Chemical Formula: C6H4(CH3)2
Product Codes:
J.T. Baker: 5377, 5813, 9483, 9489, 9490, 9493, 9494, 9499, 9516, X516
Mallinckrodt: 8664, 8668, 8671, 8672, 8802, V052

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
m-Xylene	108-38-3	40 - 65%	Yes
o-Xylene	95-47-6	15 - 20%	Yes
p-Xylene	106-42-3	< 20%	Yes
Ethyl Benzene	100-41-4	15 - 25%	Yes

3. Hazards Identification

Emergency Overview

DANGER! HARMFUL OR FATAL IF SWALLOWED. VAPOR HARMFUL. AFFECTS CENTRAL NERVOUS SYSTEM. CAUSES SEVERE EYE IRRITATION. CAUSES IRRITATION TO SKIN AND RESPIRATORY TRACT. MAY BE HARMFUL IF ABSORBED THROUGH SKIN. CHRONIC EXPOSURE CAN CAUSE ADVERSE LIVER, KIDNEY, AND BLOOD EFFECTS. FLAMMABLE LIQUID AND VAPOR.

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

Health Rating: 2 - Moderate (Life)

Flammability Rating: 2 - Moderate
Reactivity Rating: 1 - Slight
Contact Rating: 3 - Severe
Lab Protective Equip: GOGGLES; LAB COAT; VENT HOOD; PROPER GLOVES; CLASS B EXTINGUISHER
Storage Color Code: Red (Flammable)

Potential Health Effects

Inhalation:
Inhalation of vapors may be irritating to the nose and throat. Inhalation of high concentrations may result in nausea, vomiting, headache, ringing in the ears, and severe breathing difficulties which may be delayed in onset. Substernal pain, cough, and hoarseness are also reported. High vapor concentrations are anesthetic and central nervous system depressants.
Ingestion:
Ingestion causes burning sensation in mouth and stomach, nausea, vomiting and salivation. Minute amounts aspirated into the lungs can produce a severe hemorrhagic pneumonitis with severe pulmonary injury or death.
Skin Contact:
Skin contact results in loss of natural oils and often results in a characteristic dermatitis. May be absorbed through the skin.
Eye Contact:
Vapors cause eye irritation. Splashes cause severe irritation, possible corneal burns and eye damage.
Chronic Exposure:
Chronic inhalation can cause headache, loss of appetite, nervousness and pale skin. Repeated or prolonged skin contact may cause a skin rash. Repeated exposure of the eyes to high concentrations of vapor may cause reversible eye damage. Repeated exposure can damage bone marrow, causing low blood cell count. May damage the liver and kidneys.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems, or impaired liver, kidney, blood, or respiratory function may be more susceptible to the effects of the substance.

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4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician immediately.
Ingestion:
Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. Call a physician immediately.
Skin Contact:
Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting lower and upper eyelids occasionally. Get medical attention immediately.

---

5. Fire Fighting Measures

Fire:
Flash point: 29C (84F) CC
Autoignition temperature: 464C (867F)
Flammable limits in air % by volume:

lel: 1.0; uel: 7.0
Explosion:
Above flash point, vapor-air mixtures are explosive within flammable limits noted above. Contact with strong oxidizers may cause fire. Sealed containers may rupture when heated. Sensitive to static discharge.
Fire Extinguishing Media:
Dry chemical, foam or carbon dioxide. Water spray may be used to keep fire exposed containers cool, dilute spills to nonflammable mixtures, protect personnel attempting to stop leak and disperse vapors.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode. Vapors can flow along surfaces to distant ignition source and flash back.

---

6. Accidental Release Measures

Ventilate area of leak or spill. Remove all sources of ignition. Wear appropriate personal protective equipment as specified in Section 8. Isolate hazard area. Keep unnecessary and unprotected personnel from entering. Contain and recover liquid when possible. Use non-sparking tools and equipment. Collect liquid in an appropriate container or absorb with an inert material (e. g., vermiculite, dry sand, earth), and place in a chemical waste container. Do not use combustible materials, such as saw dust. Do not flush to sewer! If a leak or spill has not ignited, use water spray to disperse the vapors, to protect personnel attempting to stop leak, and to flush spills away from exposures. US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

J. T. Baker SOLUSORB® solvent adsorbent is recommended for spills of this product.

---

7. Handling and Storage

Protect against physical damage. Store in a cool, dry well-ventilated location, away from any area where the fire hazard may be acute. Outside or detached storage is preferred. Separate from incompatibles. Containers should be bonded and grounded for transfers to avoid static sparks. Storage and use areas should be No Smoking areas. Use non-sparking type tools and equipment, including explosion proof ventilation. Containers of this material may be hazardous when empty since they retain product residues (vapors, liquid); observe all warnings and precautions listed for the product. Do Not attempt to clean empty containers since residue is difficult to remove. Do not pressurize, cut, weld, braze, solder, drill, grind or expose such containers to heat, sparks, flame, static electricity or other sources of ignition: they may explode and cause injury or death.

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8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
-OSHA Permissible Exposure Limit (PEL):
100 ppm (TWA) xylene
100 ppm (TWA) ethylbenzene
-ACGIH Threshold Limit Value (TLV):
xylene: 100 ppm (TWA) 150 ppm (STEL), A4 - Not classifiable as a human carcinogen.
ethyl benzene: 100 ppm (TWA) 125 ppm (STEL), A3 - Confirmed Animal Carcinogen with Unknown Relevance to Humans.
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details. Use explosion-proof equipment.

Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a half-face organic vapor respirator may be worn for up to ten times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. A full-face piece organic vapor respirator may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. For emergencies or instances where the exposure levels are not known, use a full-face piece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres. Where respirators are required, you must have a written program covering the basic requirements in the OSHA respirator standard. These include training, fit testing, medical approval, cleaning, maintenance, cartridge change schedules, etc. See 29CFR1910.134 for details.
Skin Protection:
Wear impervious protective clothing, including boots, gloves, lab coat, apron or coveralls, as appropriate, to prevent skin contact.
Eye Protection:
Use chemical safety goggles and/or a full face shield where splashing is possible. Maintain eye wash fountain and quick-drench facilities in work area.

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9. Physical and Chemical Properties

The following physical data is for xylene.
Appearance:
Clear, colorless liquid.
Odor:
Characteristic odor.
Solubility:
Insoluble in water.
Specific Gravity:
0.86 @ 20C/4C
pH:
Not applicable.
% Volatiles by volume @ 21C (70F):
100
Boiling Point:
137 - 140C (279 - 284F)
Melting Point:
-25C (-13F)
Vapor Density (Air=1):
3.7
Vapor Pressure (mm Hg):
8 @ 20C (68F)
Evaporation Rate (BuAc=1):
0.7

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10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Involvement in a fire causes formation of carbon monoxide and unidentified organic components.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Strong oxidizing agents and strong acids.
Conditions to Avoid:

Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Toxicological Data:
Xylene: oral rat LD50: 4300 mg/kg; inhalation rat LC50: 5000 ppm/4H; skin rabbit LD50: > 1700 mg/kg; Irritation eye rabbit: 87 mg mild (Std. Draize); irritation skin rabbit 500 mg/24 moderate (Std. Draize); investigated as a tumorigen, mutagen, reproductive effector.
Ethyl benzene: oral rat LD50: 3500 mg/kg; skin rabbit LD50: 17800 uL/kg; investigated as a tumorigen, mutagen, reproductive effector.
Reproductive Toxicity:
May cause teratogenic effects.

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

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
m-Xylene (108-38-3)	No	No	3
o-Xylene (95-47-6)	No	No	3
p-Xylene (106-42-3)	No	No	3
Ethyl Benzene (100-41-4)	No	No	2B

12. Ecological Information

Environmental Fate:
Following data for xylene: When released into the soil, this material may evaporate to a moderate extent. When released into the soil, this material is expected to leach into groundwater. When released into the soil, this material may biodegrade to a moderate extent. When released into water, this material may evaporate to a moderate extent. When released into water, this material may biodegrade to a moderate extent. When released into the air, this material may be moderately degraded by reaction with photochemically produced hydroxyl radicals. When released into the air, this material is expected to have a half-life of less than 1 day. This material is not expected to significantly bioaccumulate. (mixed xylenes: octanol / water partition coefficient 3.1 - 3.2; bioconcentration factor = 1.3, eels)
Environmental Toxicity:
For xylene: This material is expected to be slightly toxic to aquatic life. The LC50/96-hour values for fish are between 10 and 100 mg/l.

13. Disposal Considerations

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

14. Transport Information

Domestic (Land, D.O.T.)

Proper Shipping Name: RQ, XYLENES
Hazard Class: 3
UN/NA: UN1307
Packing Group: III
Information reported for product/size: 398LB

International (Water, I.M.O.)

Proper Shipping Name: XYLENES
Hazard Class: 3
UN/NA: UN1307
Packing Group: III
Information reported for product/size: 398LB

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15. Regulatory Information

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

Ingredient	TSCA	EC	Japan	Australia
m-Xylene (108-38-3)	Yes	Yes	Yes	Yes
o-Xylene (95-47-6)	Yes	Yes	Yes	Yes
p-Xylene (106-42-3)	Yes	Yes	Yes	Yes
Ethyl Benzene (100-41-4)	Yes	Yes	Yes	Yes

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

		--Canada--		
Ingredient	Korea	DSL	NDSL	Phil.
m-Xylene (108-38-3)	Yes	Yes	No	Yes
o-Xylene (95-47-6)	Yes	Yes	No	Yes
p-Xylene (106-42-3)	Yes	Yes	No	Yes
Ethyl Benzene (100-41-4)	Yes	Yes	No	Yes

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

	-SARA 302-		------SARA 313------	
Ingredient	RQ	TPQ	List	Chemical Catg.
m-Xylene (108-38-3)	No	No	Yes	No
o-Xylene (95-47-6)	No	No	Yes	No
p-Xylene (106-42-3)	No	No	Yes	No
Ethyl Benzene (100-41-4)	No	No	Yes	No

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

		-RCRA-	-TSCA-
Ingredient	CERCLA	261.33	8(d)
m-Xylene (108-38-3)	1000	No	No
o-Xylene (95-47-6)	1000	No	No
p-Xylene (106-42-3)	100	No	Yes
Ethyl Benzene (100-41-4)	1000	No	No

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

WARNING:
THIS PRODUCT CONTAINS A CHEMICAL(S) KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER.

Australian Hazchem Code: 3[Y]
Poison Schedule: None allocated.
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

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16. Other Information

NFPA Ratings: Health: **2** Flammability: **3** Reactivity: **0**

Label Hazard Warning:
DANGER! HARMFUL OR FATAL IF SWALLOWED. VAPOR HARMFUL. AFFECTS CENTRAL NERVOUS SYSTEM. CAUSES SEVERE EYE IRRITATION. CAUSES IRRITATION TO SKIN AND RESPIRATORY TRACT. MAY BE HARMFUL IF ABSORBED THROUGH SKIN. CHRONIC EXPOSURE CAN CAUSE ADVERSE LIVER, KIDNEY, AND BLOOD EFFECTS. FLAMMABLE LIQUID AND VAPOR.
Label Precautions:
Keep away from heat, sparks and flame.
Avoid contact with eyes, skin and clothing.
Keep container closed.
Use only with adequate ventilation.
Avoid breathing vapor.
Wash thoroughly after handling.
Label First Aid:
Aspiration hazard. If swallowed, vomiting may occur spontaneously, but DO NOT INDUCE. If vomiting occurs, keep head below hips to prevent aspiration into lungs. Never give anything by mouth to an unconscious person. Call a physician immediately. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact, immediately flush eyes or skin with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. In all cases get medical attention immediately.
Product Use:
Laboratory Reagent.
Revision Information:
No Changes.
Disclaimer:
****

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

MSDS Number: **Z0858** * * * * * *Effective Date: 05/07/03* * * * * * *Supercedes: 11/02/01*

MSDS Material Safety Data Sheet

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

Mallinckrodt CHEMICALS J.T.Baker

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

National Response in Canada
CANUTEC: 613-996-6666

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

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

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

ZINC METAL POWDER

1. Product Identification

Synonyms: Powdered zinc; blue powder; CI77945; CI Pigment Black 16
CAS No.: 7440-66-6
Molecular Weight: 65.37
Chemical Formula: Zn
Product Codes:
J.T. Baker: 4282
Mallinckrodt: 8681

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Zinc	7440-66-6	96 - 97%	Yes
Zinc Oxide	1314-13-2	0 - 3%	Yes
Lead	7439-92-1	0 - 0.3%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED OR INHALED. MAY CAUSE IRRITATION TO SKIN, EYES, AND RESPIRATORY TRACT. MAY FORM COMBUSTIBLE DUST CONCENTRATIONS IN AIR. WATER REACTIVE. MAY AFFECT THE GUM TISSUE, CENTRAL NERVOUS SYSTEM, KIDNEYS, BLOOD AND REPRODUCTIVE SYSTEM (lead component).

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

Health Rating: 1 - Slight
Flammability Rating: 3 - Severe (Flammable)
Reactivity Rating: 2 - Moderate

Contact Rating: 1 - Slight
Lab Protective Equip: GOGGLES; LAB COAT; CLASS D EXTINGUISHER
Storage Color Code: Orange (General Storage)

Potential Health Effects

Inhalation:
No adverse effects expected but dust may cause mechanical irritation. The effects may be expected to resemble those of inhaling an inert dust; possible difficulty in breathing, sneezing, coughing. When heated, the fumes are highly toxic and may cause fume fever.
Ingestion:
Extremely large oral dosages may produce gastrointestinal disturbances, due both to mechanical effects and the possibility of reaction with gastric juice to produce zinc chloride. Pain, stomach cramps and nausea could occur in aggravated cases.
Skin Contact:
May cause irritation.
Eye Contact:
May cause irritation.
Chronic Exposure:
No adverse health effects expected.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or impaired respiratory function may be more susceptible to the effects of the substance.

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4. First Aid Measures

Inhalation:
Remove to fresh air. Get medical attention for any breathing difficulty.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person.
Skin Contact:
Wipe off excess material from skin then immediately flush skin with plenty of water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.
Eye Contact:
Immediately flush eyes with plenty of water for at least 15 minutes, lifting upper and lower eyelids occasionally. Get medical attention if irritation persists.

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5. Fire Fighting Measures

Fire:
Autoignition temperature: ca. 460C (ca. 860F)
The listed autoignition temperature is for Zinc powder (layer); dust cloud is ca. 680C (1255F). Zinc powder is not pyrophoric but will burn in air at elevated temperatures. Bulk dust in damp state may heat spontaneously and ignite on exposure to air. Releases flammable hydrogen gas upon contact with acids or alkali hydroxides. Contact with strong oxidizers may cause fire.
Explosion:
Fine dust dispersed in air in sufficient concentrations, and in the presence of an ignition source is a potential dust explosion hazard.
Fire Extinguishing Media:
Smother with a suitable dry powder (sodium chloride, magnesium oxide, Met-L-X).
Special Information:

In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

6. Accidental Release Measures

Remove all sources of ignition and provide mild ventilation in area of spill. Substance may be pyrophoric and self-ignite. Clean-up personnel require protective clothing, goggles and dust/mist respirators. Sweep or vacuum up the spill in a manner that does not disperse zinc powder in the air and place the zinc in a closed container for recovery or disposal.
US Regulations (CERCLA) require reporting spills and releases to soil, water and air in excess of reportable quantities. The toll free number for the US Coast Guard National Response Center is (800) 424-8802.

7. Handling and Storage

Keep in a tightly closed container. Protect from physical damage. Store in a cool, dry, ventilated area away from sources of heat, moisture and incompatibilities. Containers of this material may be hazardous when empty since they retain product residues (dust, solids); observe all warnings and precautions listed for the product.

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
None for Zinc metal.
-OSHA Permissible Exposure Limit (PEL):
10 mg/m3 (TWA), for zinc oxide fume
-ACGIH Threshold Limit Value (TLV):
10 mg/m3 (TWA), Inhalable fraction, A4 Not classifiable as a human carcinogen for zinc oxide.

Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures below the Airborne Exposure Limits. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of Recommended Practices*, most recent edition, for details.
Personal Respirators (NIOSH Approved):
If the exposure limit is exceeded and engineering controls are not feasible, a full facepiece particulate respirator (NIOSH type N100 filters) may be worn for up to 50 times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids. glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear protective gloves and clean body-covering clothing.
Eye Protection:
Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

9. Physical and Chemical Properties

Appearance:
Gray or bluish-gray powder.
Odor:
Odorless.

Solubility:
Insoluble in water.
Density:
7.14
pH:
No information found.
% Volatiles by volume @ 21C (70F):
0
Boiling Point:
907C (1665F)
Melting Point:
419C (786F)
Vapor Density (Air=1):
No information found.
Vapor Pressure (mm Hg):
1 @ 487C (909F)
Evaporation Rate (BuAc=1):
No information found.

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage. Moist zinc dust can react exothermically and ignite spontaneously in air.
Hazardous Decomposition Products:
Hydrogen in moist air, zinc oxide with oxygen at high temperature. Zinc metal, when melted, produces zinc vapor which oxidizes and condenses in air to form zinc fume.
Hazardous Polymerization:
Will not occur.
Incompatibilities:
Zinc powder can react violently with water, sulfur and halogens. Dangerous or potentially dangerous with strong oxidizing agents, lower molecular weight chlorinated hydrocarbons, strong acids and alkalis.
Conditions to Avoid:
Heat, flames, ignition sources and incompatibles.

11. Toxicological Information

Zinc: Irritation skin, human: 300 ug/3D-I mild; investigated as a mutagen.

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

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Zinc (7440-66-6)	No	No	None
Zinc Oxide (1314-13-2)	No	No	None
Lead (7439-92-1)	No	No	2B

12. Ecological Information

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

13. Disposal Considerations

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

14. Transport Information

Not regulated.

15. Regulatory Information

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

Ingredient	TSCA	EC	Japan	Australia
Zinc (7440-66-6)	Yes	Yes	No	Yes
Zinc Oxide (1314-13-2)	Yes	Yes	Yes	Yes
Lead (7439-92-1)	Yes	Yes	Yes	Yes

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

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Zinc (7440-66-6)	Yes	Yes	No	Yes
Zinc Oxide (1314-13-2)	Yes	Yes	No	Yes
Lead (7439-92-1)	Yes	Yes	No	Yes

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

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Zinc (7440-66-6)	No	No	Yes	No
Zinc Oxide (1314-13-2)	No	No	No	Zinc compoun
Lead (7439-92-1)	No	No	Yes	No

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

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Zinc (7440-66-6)	1000	No	No
Zinc Oxide (1314-13-2)	No	No	No
Lead (7439-92-1)	10	No	No

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

WARNING:
THIS PRODUCT CONTAINS CHEMICALS KNOWN TO THE STATE OF CALIFORNIA TO CAUSE CANCER AND BIRTH DEFECTS OR OTHER REPRODUCTIVE HARM.

Australian Hazchem Code: 4Y
Poison Schedule: S6
WHMIS:
This MSDS has been prepared according to the hazard criteria of the Controlled Products Regulations (CPR) and the MSDS contains all of the information required by the CPR.

16. Other Information

NFPA Ratings: Health: **1** Flammability: **1** Reactivity: **1** Other: **Water reactive**

ATTACHMENT III

Heat Stress/Cold Stress and Related Illnesses

Attachment III – Heat Stress / Cold Stress

1.0 HEAT STRESS

Excessive exposure to a hot environment can bring about a variety of heat-induced disorders. The four main types of heat stress related illnesses: heat rash, heat cramps, heat exhaustion, and heat stroke, are discussed below.

1.1 Heat Rash

Heat rash also know as prickly heat, is likely to occur in hot, humid environments where sweat is not readily removed from the surface of the skin by evaporation and the skin remains wet most of the time. The sweat ducts become plugged, and a skin rash soon appears. When the rash is extensive or when it is complicated by an infection, prickly heat can be very uncomfortable and may reduce a worker's performance. The worker can prevent this condition by resting in a cool place part of each day and by regularly bathing and drying the skin.

1.2 Heat Cramps

Heat cramps are painful spasms of the muscles that occur among those who sweat profusely in heat, drink large quantities of water, but do not adequately replace the body's salt loss. Drinking large quantities of water tends to dilute the body's fluids, while the body continues to lose salt. Shortly thereafter, the low salt level in the muscles causes painful cramps. The affected muscles may be part of the arms, legs or abdomen, but tired muscles (those used to perform the work) are usually the ones most susceptible to cramps. Cramps may occur during or after work hours and may be relieved by taking salted liquids by mouth, such as the variety of sports drinks on the market.

Caution Should Be Exercised By People With Heart Problems Or Those On Low Sodium Diets Who Work In Hot Environments. These People Should Consult A Physician About What To Do Under These Conditions.

1.3 Heat Exhaustion

Heat exhaustion includes several clinical disorders having symptoms that may resemble the early symptoms of heat stroke. Heat exhaustion is caused by the loss of large amounts of fluid by sweating, sometimes with excessive loss of salt. A worker suffering from this condition still sweats but experiences extreme weakness or fatigue, giddiness, nausea, or headache. In more serious cases, the victim may vomit or lose consciousness. The skin is clammy and moist, the complexion is pale or flushed, and the body temperature is normal or only slightly elevated.

A summary of the key symptoms of heat exhaustion is as follows:

- Clammy skin
- Confusion
- Dizziness
- Fainting
- Fatigue
- Heat Rash
- Light-headedness
- Nausea
- Profuse sweating
- Slurred Speech
- Weak Pulse

In most cases, treatment involves having the victim rest in a cool place and drink plenty of fluids. Victims with mild cases of heat exhaustion usually recover spontaneously with this treatment. Those with severe cases may require extended care for several days. There are no known permanent effects.

As With Heat Cramps, Certain Persons Should Consult With Their Physician About What To Do Under These Conditions.

1.4 Heat Stroke

This is the most serious of health problems associated with working in hot environments. It occurs when the body's temperature regulatory system fails and sweating becomes inadequate.

The body's only effective means of removing excess heat is compromised with little warning to the victim that a crisis stage has been reached.

A heat stroke victim's skin is hot, usually dry, red or spotted. Body temperature is usually 105^{o}F or higher, and the victim is mentally confused, delirious, perhaps in convulsions, or unconscious. Unless the victim receives quick and appropriate treatment, death can occur.

A summary of the key symptoms of heatstroke is as follows:

- Confusion
- Convulsions
- Incoherent Speech
- Staggering Gait
- Unconsciousness
- Sweating stops
- Hot skin, high temperature (yet extremities may feel chilled)

Any person with signs or symptoms of heat stroke requires immediate hospitalization. However, first aid should be immediately administered. This includes moving the victim to a cool area, thoroughly soaking the clothing with water, and vigorously fanning the body to increase cooling. Further treatment at a medical facility should include continuation of the cooling process and the monitoring of complications that often accompany the heat stroke. Early recognition and treatment of heat stroke are the only means of preventing permanent brain damage or death.

1.5 Preparing for the Heat

Humans, to a large extent, are capable of adjusting to heat. This acclimation to heat, under normal circumstances, usually takes about 5 to 7 days, during which time the body will undergo a series of changes that will make continued exposure to heat more tolerable.

On the first day of exposure, body temperature, pulse rate, and general discomfort will be higher. With each succeeding day of exposure, all of these responses will gradually decrease, while the sweat rate will increase. When the body does become acclimated to the heat, the worker will find it possible to perform work with less strain and distress.

A gradual exposure to heat gives the body time to become accustomed to higher temperatures, such as those encountered in chemical protective clothing.

1.6 Protecting Against Heat Stress

There are several methods that can be used to reduce heat stress:

- Limit duration of work periods
- Use protective clothing with cooling devices
- Enforce the use of the "Buddy System"
- Consume electrolyte solutions prior to suiting up
- Monitor workers for pulse recovery rates, body fluid loss, body weight loss, and excess fatigue
- Screen for heat stress susceptible candidates in your medical surveillance program
- Have all personnel know the signs and symptoms of heat stress

2.0 COLD STRESS

Persons working outdoors in temperatures at or below freezing may be frostbitten. Extreme cold for a short time may cause severe injury to the surface of the body, or result in profound generalized cooling, causing death. Areas of the body that have high surface-area-to-volume ratio such as fingers, toes, and ears, are the most susceptible. Two factors influence the development of a cold injury, ambient temperature and the velocity of the wind. Wind chill is used to describe the chilling effect of moving air in combination with low temperature. For instance, 10 degrees Fahrenheit with a wind of 15 miles per hour (mph) is equivalent in chilling effect to still air at minus 18 degrees Fahrenheit.

As a general rule, the greatest incremental increase in wind chill occurs when a wind of 5 mph increases to 10 mph. Additionally, water conducts heat 240 times faster than air. Thus, the body cools suddenly when chemical-protective equipment is removed if the clothing underneath is perspiration soaked.

2.1 Frostbite

Local injury resulting from cold is included in the generic term frostbite. There are several degrees of damage. Frostbite of the extremities can be categorized into:

- Frost Nip or Initial Frostbite: characterized by suddenly blanching or whitening of skin.
- Superficial Frostbite: skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.
- Deep Frostbite: tissues are cold, pale, and solid; extremely serious injury.

2.2 Hypothermia

Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature. Its symptoms are usually exhibited in five stages:

- Shivering
- Apathy, listlessness, sleepiness, and (sometimes rapid cooling of the body to less than 95°F)
- Unconsciousness, glassy stage, slow pulse, and slow respiratory rate
- Freezing of the extremities
- Death

Thermal socks, long cotton or thermal underwear, hard hat liners and other cold weather gear can aid in the prevention of hypothermia. Blankets and warm drinks (other than caffeinated coffee) are also recommended.

Measures shall be taken to keep workers from getting wet, such as issuance of rain gear.
Workers whose cloths become wet shall be given the opportunity to dry off and change clothes.