

ARCS II CONTRACT NO. 68-W9-0024

WORK ASSIGNMENT # 046-2LC3

SITE NAME: CHEMSOL, INC.

REVISED HEALTH AND SAFETY PLAN

OCTOBER, 1992

CONTRACTOR QA/QC SIGN OFF

CDM Federal has reviewed this draft document in accordance with the contractor's ARCS II QAPP and is submitting it to USEPA, Region II in compliance with the requirements under Work Assignment No. 046-2LC3 and Contract No. 68-W9-0024.

This document has not been approved by USEPA Region II and is not intended for release to the public.

*Maheyar Bilimoria*

Maheyar Bilimoria, Ph.D  
ARCS II SITE MANAGER

*Robert D. Goltz*

Robert D. Goltz, P.E.  
ARCS II REGIONAL PROGRAM MANAGER

Date: 10/14/92

Date: 10/14/92

**CHEMSOL INC.  
HEALTH AND SAFETY PLAN**

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## 1.0 APPROVALS

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By their signature the undersigned certify that this HSP is approved and will be utilized at the Chemsol, Inc. Project Site.

*Myron A. Bennett*  
Health and Safety Coordinator

10/14/92  
Date

*Joseph L. Linn*  
Project Manager

10/14/92  
Date

*W.D. [Signature]*  
ARCS II Program Manager

10/14/92  
Date

CHEMSOL, INC. REMEDIAL INVESTIGATION  
SITE HEALTH AND SAFETY PLAN

ACKNOWLEDGEMENT

Employee Acknowledgement (To be signed by CDM Federal field personnel and subcontractor employees prior to their work on the site).

I acknowledge that I have reviewed the information in this Site Specific Health and Safety Plan (SSHSP) and understand both the potential hazards which may confront me during field investigative activities at the Chemsol, Inc. site and the procedures outlined in this plan to minimize those hazards.

I will comply with all the provisions outlined in this SSHSP.

<u>Employee</u>	<u>Company</u>	<u>Date</u>
_____	_____	_____
_____	_____	_____
_____	_____	_____
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## 2.0 INTRODUCTION

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### 2.1 PURPOSE

This Site Specific Health and Safety Plan (SSHSP) has been developed to address the safety and health hazards of the various tasks which shall be required to complete the Remedial Investigation/Feasibility Study (RI/FS) of the Chemsol, Inc. site. Approval of the SSHSP by the CDM Federal Health and Safety Coordinator is required prior to the commencement of any RI/FS field activities.

Safety, health and emergency response procedures are outlined for preventing accidents and protecting personnel from injury and occupational illness while investigative activities are ongoing at the site. Included in this SSHSP are the assignment of responsibilities, personnel protection minimum requirements, safe work practices and emergency response procedures. This document is based upon available historical information, prior land use and an assessment of potential physical and chemical hazards associated with the site and activities related to the planned investigations.

Real-time monitoring will be performed during the course of the field investigation to determine ambient and breathing zone levels of airborne contaminants. The SSHSP will be modified as appropriate to address current site conditions requiring a modification of tasks. Modification will be made by written addenda to this SSHSP, and each modification topic and title will be noted on the record of changes provided in the front of this document.

Consistent with the contents of this SSHSP, all work will be performed in a safe and environmentally acceptable manner. Sound judgment is to be exercised in order to minimize any exposure risk to the community. Strict adherence to the SSHSP will help prevent injury and/or exposure hazards to the field personnel and the community. A copy of this SSHSP will be available on-site as part of the Health & Safety File during all ongoing field activities.

### 2.2 REGULATORY REQUIREMENTS AND GUIDELINES

The procedures outlined in this SSHSP comply with the Occupational Safety and Health Administration (OSHA) requirements contained in 29 CFR 1910.120 and 1910.126. The procedures are also consistent with the guidelines contained in the Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities jointly prepared by the EPA, National Institute for Occupational Safety and Health (NIOSH), OSHA, the U.S. Coast Guard (USCG), EPA's Standard Operating Safety Guides, and the CDM Federal Health and Safety Assurance Manual for Hazardous Waste Sites.



## 3.0 SITE BACKGROUND

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### 3.1 SITE LOCATION AND DESCRIPTION

The Chemsol, Inc. site is a 40-acre tract located on Fleming Street in the Township of Piscataway, Middlesex County, New Jersey (Figures 3-1 and 3-2). Interstate Route 287 is located approximately one-half mile south of the site. The Reading Railroad is located adjacent to the southern property boundary. Single family residences are located immediately west and northwest and industrial and retail/wholesale businesses are located south and east of the site. An apartment complex is located north of the site.

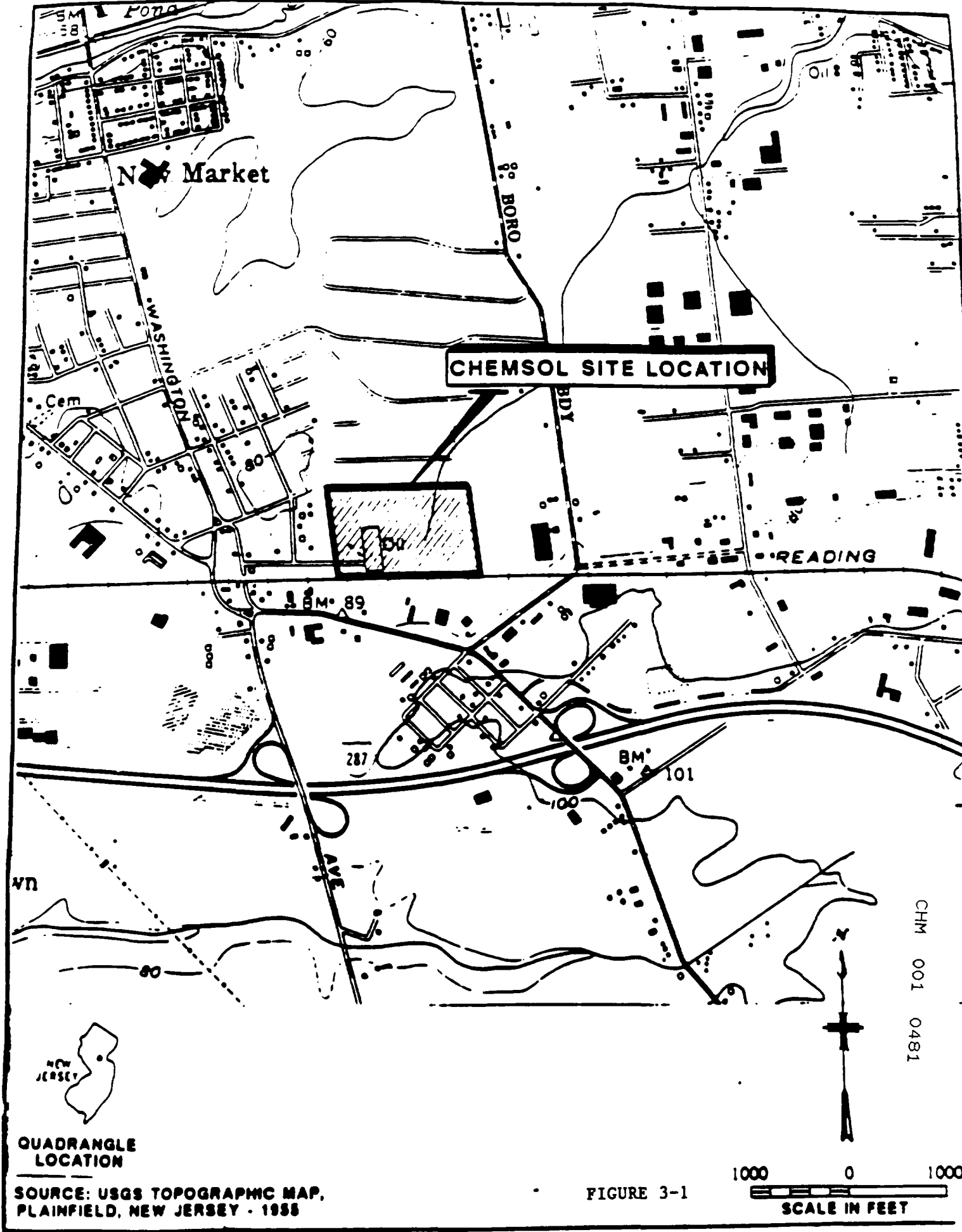
### 3.2 SITE HISTORY

In the 1950s and 1960s, the Chemsol Project site was occupied by a chemical reprocessing firm known at various times as Chemsol Corporation and Chemsol, Inc. Operations at the site included solvent recovery and plastics manufacturing. The current owner of the site is Tang Realty, Inc.

Historically, there have been several fires and explosions at Chemsol. In September 1958, a still exploded. In June 1961, a fire started when a 50 gallon drum of Hexane solvent exploded, and in June 1962, a fire started when a pile of approximately 500,000 pounds of wax was ignited by a spark from a nearby tractor. In October 1964, a reaction of aluminum chloride and water generated hydrogen chloride gas which resulted in the evacuation of the area in the vicinity of the site.

The owner was ordered by the Township in 1964 to cease operations. The plant was dismantled in the following year (1965) and operations ceased at the site. Several large mounds of plastic waste were left behind. In 1976, a grass fire ignited one of the mounds. The Piscataway fire inspector subsequently signed a complaint against Tang Realty for failure to clear the waste mounds. In 1978, the site was rezoned from industrial to residential.

Since 1983, the New Jersey Department of Environmental Protection and Energy has ordered Tang Realty to perform a number of site investigations related to ground water contamination under Administrative Orders. Investigations have been conducted from 1980 to 1990 by J.W. Patterson and Associates, Lancy Laboratories Division of Lancy International, Applied Geotechnical and Environmental Services Corporation and Harding Lawson Associates. The investigations revealed that the soils and ground water on the site were contaminated with polychlorinated biphenyls (PCBs), volatile organic



N Market

BORO

**CHEMSOL SITE LOCATION**

WASHINGTON

READING

BM 89

BM 101

287

100

vn

AVE

NEW JERSEY

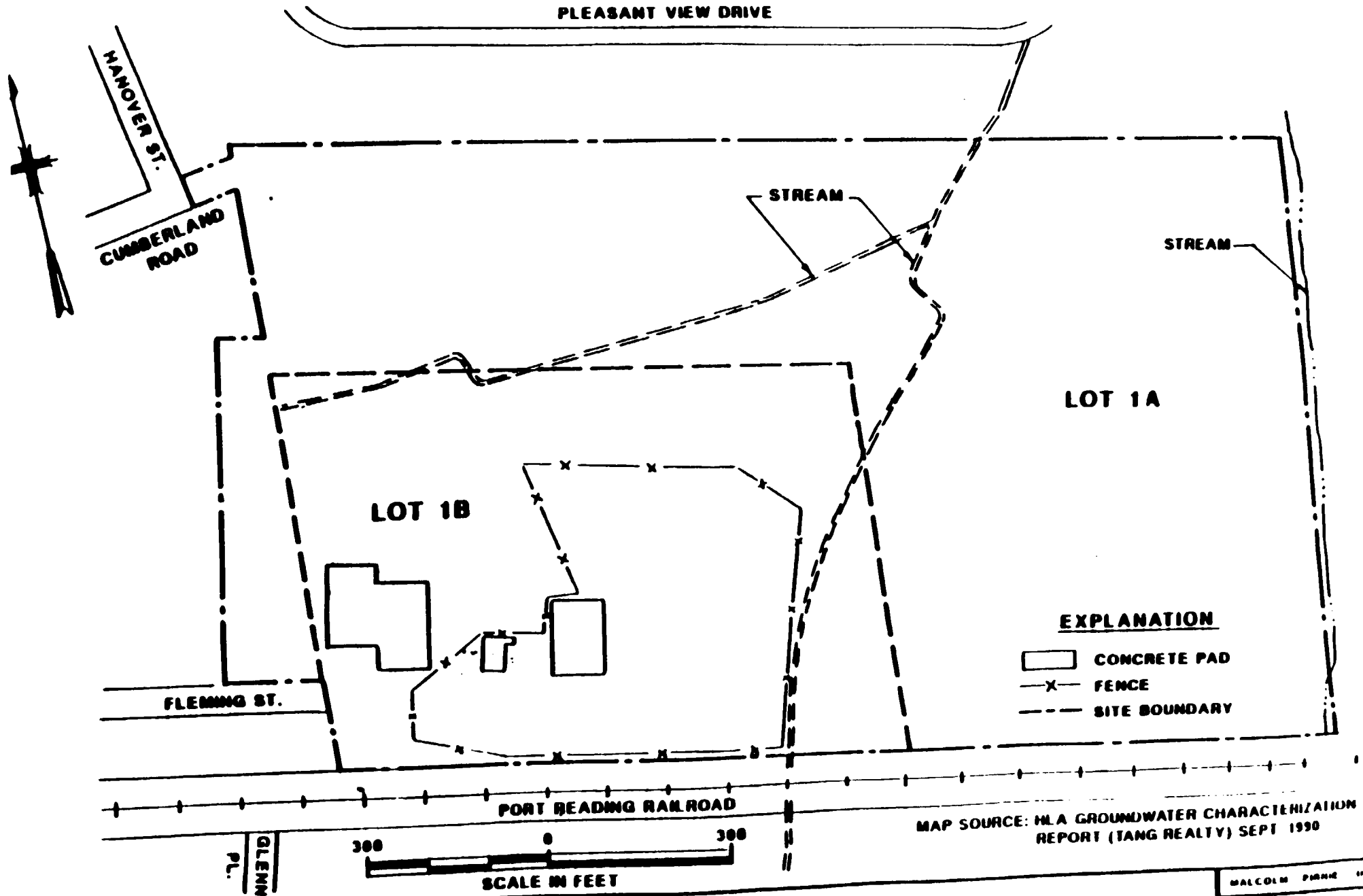
QUADRANGLE LOCATION

SOURCE: USGS TOPOGRAPHIC MAP, PLAINFIELD, NEW JERSEY - 1958

FIGURE 3-1

1000 0 1000  
SCALE IN FEET

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MAP SOURCE: MLA GROUNDWATER CHARACTERIZATION REPORT (TANG REALTY) SEPT 1990

compounds, semivolatile organic compounds and metals. However, the vertical and horizontal extent of contamination has not been adequately delineated. Therefore, the USEPA notified Tang Realty (November 1990) that Federal funds would be used to identify the nature and extent of the release (or threatened release) of hazardous substances and to evaluate remedial alternatives to address these releases.

### 3.3 CURRENT CONDITIONS

The site is currently unoccupied. A 6'-8' chain-link fence surrounds a portion of Lot 1B where soils with high concentrations of PCBs had been excavated. Three concrete foundations remain on the western portion of Lot 1B. A trailer and one portable tank are also present.

### 3.4 PROPOSED WORK

The purpose of the RI/FS is to determine the source(s), nature, and extent of contamination at the site and to evaluate methods of remediation. The investigation will include (83) soil borings, installation of 13 new monitoring wells, soil, sediment, air sampling and surface and groundwater sampling. A topographic survey, a geophysical investigation and a pump test will also be performed during the remedial investigation, as well as a study of the possible existence of wetlands. The data resulting from the investigation will be used to evaluate potential risks to the environment and human health, evaluate and recommend alternative remediation technologies.

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## 4.0 PROJECT ORGANIZATION AND RESPONSIBILITY

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### 4.1 RESPONSIBILITIES OF SAFETY PERSONNEL

4.1.1 Program Manager - The ARCS II Program Manager (PM) has the overall responsibility for health and safety of CDM Federal personnel assigned under this Contract. The operational aspects of this responsibility are delegated to the Health and Safety Manager (HSM).

4.1.2 Health and Safety Manager (HSM) - The HSM is responsible for development and implementation of the ARCS II Health and Safety Program. The HSM functions as a liaison with EPA Region II, OSHA and other agencies on ARCS II health and safety issues. The HSM conducts or directs periodic site audits to ensure successful implementation of the Site Specific Health and Safety Plan.

4.1.3 Project Manager (PM) - The Project Manager has overall responsibility for implementing and executing an effective program of site-specific personnel protection and accident prevention. The Project Manager supervises the allocation of resources and staffing to implement specific aspects of the SSHSP, and may delegate authority to expedite and facilitate any application of the program.

4.1.4 Site Safety and Health Coordinator (SHSC) - The Site Specific Health and Safety Coordinator (SHSC) is knowledgeable in safety and worker protection techniques as they relate to the project. Responsibilities include monitoring the day to day compliance of work to this SSHSP, having the ability and authority to make needed changes or additions to the plan and providing technical assistance to project management on problems relating to work site safety.

The SHSC is also responsible for air monitoring as well as the interpretation and documentation of health and safety related data relevant to work activities at the site. As data are obtained and evaluated, the SHSC may modify this SSHSP following consultation with the HSM. The levels of personnel protection outlined in this plan may be upgraded or downgraded based on such information; the levels of personal protection outlined in this plan cannot be downgraded without the approval of the HSM. The SHSC will conduct site-specific training and regular on-site briefings pertaining to health and safety requirements of the project.

The SHSC is responsible for the development and set-up of emergency procedures and personal decontamination procedures. The SHSC shall complete a daily log of activities with health and safety

relevance. At any time unsafe work conditions are determined, the SHSC is authorized to stop work. Resolution of all on-site health and safety problems will be coordinated through the Project Manager with assistance from the HSM. If the SHSC is not present, another member of the field team will be designated to perform the SHSC's duties.

4.1.5 Field Personnel - Field personnel are required to become thoroughly familiar with this SSHSP, follow the health and safety procedures and guidelines outlined and use task-designated, personnel protective equipment as designated in the SSHSP. Field personnel are expected to contribute to ongoing site safety by strictly adhering to the SSHSP and reporting unsafe working conditions to the SHSC and/or the Field Team Leader.

4.1.6 Subcontractor Personnel - Subcontractor personnel will follow the health and safety procedures and guidelines outlined in this SSHSP. Subcontractors whose work will be performed on-site, or who otherwise could be exposed to health and safety hazards will be advised of the known hazards through distribution of site information obtained by CDM Federal and this SSHSP. The Subcontractor shall be solely responsible for the health and safety of his/her employees and shall comply with all applicable laws and regulations. All subcontractors are responsible for: (1) providing their own personnel protective equipment; (2) training their employees in accordance with Federal, State and local laws; (3) providing medical surveillance examinations and obtaining medical approvals for their employees; (4) providing copies of medical and training records for employees and/or before the first day of work; (5) ensuring that their employees are advised of and meet the requirements of this SSHSP and any other additional measures required by their site activities. Additional health and safety procedures may be required by the subcontractor. Subcontractors will ensure that their personnel are familiar with the proper use of personnel protective equipment in order to protect themselves and fellow workers from injury and to prevent damage to material, equipment, and facilities. Subcontractor personnel will contribute any suggestions and assist in discovering or correcting unsafe working conditions.

4.1.7 Project Personnel - The following CDM Federal personnel have health and safety responsibility for this project:

Corporate Health and Safety Manager

Name: Chuck Myers

Work Telephone: (703) 968-0900

Project Manager

Name: Maheyar Bilimoria

Work Telephone: (908) 757-9500

Regional Health and Safety Supervisor/Health and Safety Coordinator

Name: Virginia Barnett

Work Telephone: (212) 393-9634

ARCS II Manager

Name: Robert Goltz

Work Telephone: (212) 393-9634

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## 5.0 HAZARD ASSESSMENT

### 5.1 HAZARDOUS SUBSTANCE CHARACTERISTICS AND TOXICOLOGY

The major contaminants found in the soils were PCBs, Aroclor 1248 and 1252. The highest concentrations detected was 300 mg/kg (Lancy, 1985). The contaminants detected in the groundwater on-site and the range of values measured are presented in Table 5-1. Chemical constituents and compounds selected from that list which may pose a potential risk to human health are listed below:

#### ORGANICS

Benzene	Carbon Tetrachloride
Chlorobenzene	1,2-Dichlorobenzene
Chloroform	1,2-Dichloroethane
1,2-Dichloroethene	1,1-Dichloroethene
1,2-Dichloropropane	Methylene Chloride
Toluene	Phenol
Tetrachloroethene	Ethylbenzene
Vinyl Chloride	Trichloroethene
Polychlorinated Biphenyls (PCBs)	Xylenes

#### METALS/INORGANICS

Arsenic	Lead
Zinc	Nickel

The environmental fate and transport, pharmacokinetics and toxicology of the listed chemicals are described below. Occupational guidance levels (Permissible Exposure Limits set by OSHA) and relevant physical and chemical data for the organic compounds are presented in Table 5-2 and can be found in the Chemical Data Sheets (Appendix A). Much of the toxicological data for these chemicals are derived from long-term (chronic) exposure from ingestion and/or inhalation exposure routes. Oral and dermal exposures over short time frames (acute and subchronic) are the conditions most directly applicable to any potential exposure to these compounds during the investigative activities at this site. Information on the effects of short-term exposures is provided.



TABLE 5-1  
 Focused Feasibility Study Contaminant Data  
 Chemical, Inc., Piscataway, New Jersey

Chemical	FFS DATA April, 1991			Chemical	FFS DATA April, 1991		
	Frequency of Detection	Highest Concentration (ug/l)	Well Location		Frequency of Detection	Highest Concentration (ug/l)	Well Location
<b>VOLATILE ORGANICS</b>				<b>SEMIVOLATILE ORGANICS</b>			
Acetone	2/22	81,000 D	C-1	Naphthalene	8/21	110 J	C-1
Benzene	14/22	17,000 D	C-1	Nitrobenzene	3/21	580	C-1
2-Butanone	5/22	20,000 D	C-1	2-Nitrophenol	2/21	220	C-1
Carbon Disulfide	4/22	310 J	C-1	4-Nitrophenol	1/21	14 J	OW-02
Carbon Tetrachloride	12/22	33,000 J	TW-7	Phenol	8/21	1500	C-1
Chlorobenzene	9/22	5,500	C-1	bis (2-Ethoxyethyl) Phthalate	6/21	33 J	OW-01
Chloroethane	0/22	---	---	1,2,3-Trichlorobenzene	NA	---	---
Chloroform	16/22	55,000	C-1	1,2,4-Trichlorobenzene	8/21	120 J	C-1
1,1-Dichloroethane	10/22	680	C-1	2,4,6-Trichlorophenol	0/18	---	---
1,2-Dichloroethane	11/22	21,000	C-1	<b>PESTICIDES AND PCBs</b>			
1,1-Dichloroethene	8/22	2,300 J	C-1	a-BHC	5/21	0.43 N	C-1
trans-1,2-Dichloroethene	NA	---	---	b-BHC	1/21	0.034 J	OW-02
1,2-Dichloroethene (total)	14/22	20,000 D	TW-06	d-BHC	4/21	0.064 N	C-1
1,2-Dichloropropane	2/22	300 J	C-1	g-BHC	6/21	0.028 JP	TW-04
Ethylbenzene	7/22	1600	C-1	4,4'-DDD	1/21	0.0062 JN	TW-03
2-Hexanone	2/22	190 J	C-1	4,4'-DDE	1/21	0.0088 JN	TW-05
4-Methyl-2-Pentanone	5/22	10,000	C-1	Endosulfan I	1/21	0.0087 JN	TW-06
Methylene Chloride	2/22	3,200 BJ	TW-04	Heptachlor epoxide	3/21	0.011 JN	OW-01
1,1,2,2-Tetrachloroethane	5/22	1,400	C-1	PCB-1248	0/21	---	---
Tetrachloroethene	12/22	1,300	C-1	<b>INORGANICS</b>			
Toluene	9/22	26,000 D	C-1	Aluminum	21/21	21,100	OW-04
1,1,1-Trichloroethane	7/22	8,600 DJ	C-1	Antimony	1/21	47.5 J	C-1
1,1,2-Trichloroethane	3/22	150 J	C-1	Arsenic	12/21	18.3	OW-02
Trichloroethane	17/22	220,000 D	C-1	Barium	21/21	2830	TW-04
Trichlorofluoromethane	NA	---	---	Calcium	21/21	290,000	C-1
Vinyl Chloride	5/22	450 J	C-1	Chromium	18/21	46.5	OW-04
Xylenes (total)	8/22	6,800 J	C-1	Cobalt	7/21	42.9	OW-04
<b>SEMIVOLATILE ORGANICS</b>				Copper	5/21	884	TW-14
Acenaphthene	0/21	---	---	Cyanide	6/21	78 NJ	TW-05A
Acrolein	0/21	---	---	Iron	21/21	84,800 J	TW-11
Benzoic Acid	0/21	---	---	Lead	21/21	33.4	OW-02
Butylbenzylphthalate	6/21	73	TW-14	Magnesium	21/21	24,800	TW-04, C-1
2-Chlorophenol	2/21	3 J	TW-08	Manganese	21/21	7,270	OW-04
Dibenzofuran	0/21	---	---	Mercury	2/21	0.4	TW-11
1,2-Dichlorobenzene	8/21	1400	TW-01	Nickel	18/21	708 J	TW-04
1,3-Dichlorobenzene	8/21	42	OW-04	Potassium	21/21	8010	OW-04
1,4-Dichlorobenzene	8/21	110	OW-04	Selenium	0/21	---	---
2,4-Dichlorophenol	2/21	980	C-1	Sodium	21/21	34,200 J	C-1
Diethylphthalate	6/21	530	C-1	Vanadium	20/21	50.2	OW-04
Dimethyl Phthalate	3/21	63 J	C-1	Zinc	20/21	183	OW-04
2,4-Dimethylphenol	3/21	36 J	C-1	<b>Notes:</b>			
Di-n-Butylphthalate	3/21	160 J	C-1	J - estimated value			
Di-n-Octylphthalate	0/21	---	---	P - estimated value for pesticides			
1,2-Diphenylhydrazine	NA	---	---	NA - not analyzed			
bis (2-Chloroethyl) Ether	7/21	3,100 D	C-1	N - presumptive evidence			
Hexachloroethane	4/21	79	TW-07	B - compound also detected in the blank			
Isophorone	6/21	230	C-1	D - a secondary dilution factor was used			
2-Methylnaphthalene	3/21	11	OW-04	<b>Reference: Malcolm Pirnie, Inc. "Focused Feasibility Study: Interim Action for Groundwater, Chemical, Inc. July 1991" as amended Aug 1, 1991</b>			
2-Methylphenol	6/21	580	C-1				
4-Methylphenol	5/21	480	C-1				
ethyl isobutyl Ketone	NA	---	---				

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**TABLE 5-2  
CHEMICAL CONTAMINANTS DATA**

CHEMICAL	CHARACTERISTICS	SOURCES	TLV / PEL		
			TWA	STEL	SKIN
Benzene	C4, C5	S14, S17	0.1 ppm	5 ppm	
Carbon Tetrachloride	C4, C9	S17	1.0 ppm	--	x
Chlorobenzene	C5	S14, S17	75 ppm	--	
Chloroform	C9	S17	2.0 ppm	--	
1,2-Dichlorobenzene	C11	S17	50 ppm	--	x
1,2-Dichloroethane	C9, C11	S17	1 ppm	--	
1,1-Dichloroethene	C5, C9	S17	1 ppm	20 ppm	
1,2-Dichloropropane	C5, C9	S17	75 ppm	--	
Ethylbenzene	C5, C9	S14, S17	100 ppm	125 ppm	
Methylene Chloride	C5	S17	50 ppm	--	
Tetrachloroethane	C4, C5	S14, S17	25 ppm	200 pp	
Toluene	C5	S14, S17	50 ppm	150 ppm	
Trichloroethane	C4, C5	S14, S17	25 ppm	200 ppm	
Vinyl Chloride	C4, C5	S17	1 ppm		
Xylenes	C5	S14, S17	100 ppm	150 ppm	
1,2-Dichloroethene	C5	S17	200 ppm	--	
Phenol	C2, C4, C5, C6	S17	5 ppm	--	x
Lead	C4	S14, S17	0.05 mg/m <sup>3</sup>	--	
PCBs	C4, C9	S14, S17	0.5 mg/m <sup>3</sup>	--	x
Zinc		S14	5 mg/m <sup>3</sup>	--	
Nickel	C4	S14	0.1 mg/m <sup>3</sup>	--	
Arsenic	C4	S14	0.010 mg/m <sup>3</sup>	--	

Characteristics

Corrosive	C1	Flammable	C5
Explosive	C2	Oxidizer	C6
Radioactive	C3	Unstable	C7
Toxic	C4	Acutely Lethal	C8
		Reactive	C9
		Peroxide	C10
		Combustible	C11

Sources

Pit	S1	Piping	S11
Lagoon	S2	Buried drum	S12
Lake	S3	Surface Drum	S13
Surface Tank	S4	Soil	S14
Underground Tank	S5	Cylinder	S15
Tank Car	S6	Building	S16
Surface Water	S7	Groundwater	S17
Sediment	S8	Other	S18
Pond	S9	Unknown	S19
Process Vessel	S10		

## 5.2 SUMMARY ASSESSMENT OF HAZARDS

The chemical hazards of concern associated with the Chemsol, Inc. Project Site during the Remedial Investigation include volatile, semi-volatile and several inorganic compounds. Field activities will occur both on and off-site. Installation of 13 new monitoring wells into several zones to depths of  $\geq 400$  feet will further delineate the vertical and lateral extent of the groundwater contamination plume. The approximately 10 week period of investigation will also include a wetlands delineation and two rounds of air sampling due to persistent odors in the south-east corner of the fenced area (Lot 1B) on-site.

## 5.3 CHEMICAL HAZARDS

In addition to the volatile, semi-volatile and inorganics, PCBs (aroclor 1248 and aroclor 1252) has been determined in the soil. Benzene and vinyl chloride were also detected in the groundwater.

### 5.3.1 Acute Toxicities

PCBs: Nose, throat and lung irritation, nausea, vomiting, jaundice, abdominal pain, fatigue.

Inorganics: Flu-like symptoms, nausea, vomiting, diarrhea, stomach pain. In addition, acute symptoms of lead exposure could include insomnia, weakness, GI disturbances; acute zinc exposure can also cause excessive thirst.

Phenols: Nose and throat irritation, vomiting and nausea are the immediate effects of inhalation.

Arsenic: May cause coughing, chest pains and difficulty breathing, headache, nausea, vomiting, diarrhea and giddiness.

Methylene Chloride: Fatigue, weakness, nausea, light-headedness, blurred vision, staggered gait, numbness/tingling of limbs.

Volatile Organics: Inhalation of organic vapors can cause headaches, nausea, dizziness and intoxicating-like symptoms. Trichloroethene (TCE) is also a Central Nervous System (CNS) depressant and can cause arrhythmias and hypertension. 1,2-dichloroethene may produce weakness, tremors and epigastric cramps.

### 5.3.2 Chronic Toxicities

PCBs: Suspect carcinogen, chloracne, pigmentation (skin, nails).

Lead: Suspect carcinogen (lungs/kidneys), neuro-muscular motor weakness, hematopoietic (blood-forming), urinary and reproductive systems damage.

Phenols: Exposure can result in irregular breathing and difficulty in swallowing, blue coloration of skin, shock, unconsciousness, mental disturbances and liver and kidney damage. Target organs include liver, kidneys and skin.

Xylene/Toluene: Long-term effects of exposure to xylene can include GI tract disturbances, CNS depression and liver and kidney damage. Chronic exposure to toluene can produce loss of memory and coordination and heart palpitations. Similarly, with both contaminants, the effects may be reversible and disappear once the chemical has been removed.

TCE/Tetrachloroethene (PCE): Liver and kidney damage; long-term effects of TCE also include CNS depression, increased cardiac output and an intolerance to alcohol.

Methylene Chloride: Bone marrow depression, angina complications, speech difficulty, decreased visual and auditory response, liver damage.

Benzene: Bone marrow depression, aplastic anemia, leukemia.

Chloroform: Long term exposure can cause depression and produce hallucinations. Organ damage include liver kidneys and heart.

1,2-dichlorobenzene: Chronic exposure can cause blood changes.

Vinyl Chloride: Long-term exposure can cause CNS depression and angiosarcoma of the liver.

### 5.3.3 Eye/Skin Contact

PCBs: An eye irritant causing discharge and swelling of eyelids. Skin contact can cause an acne-like rash and formation of pustules (chloracne).

Inorganics: These compounds can cause eye irritation. Eye Contact with arsenic can lead to conjunctivitis and optic damage. Skin contact with zinc can cause irritation leading to a rash and skin contact with nickel causes itching, burning and sores (nickel itch).

Phenols: An eye irritant causing swelling and severe damage which can lead to blindness. Skin contact forms wrinkly white patches causing intense pain if irritant is not removed quickly. (See skin absorption).

Volatile Organics: These compounds cause eye irritation. PCE and ethylbenzene can also cause lacrimation and burning. 1,2-dichloroethene may cause (reversible) corneal clouding. 1,1-dichloroethene may cause (transient) corneal injury. Skin contact can result in dryness, redness and dermatitis. In addition, xylene and carbon tetrachloride have a defatting effect on the skin and ethylbenzene and 1,1-dichloroethene can produce blistering and burns.

Chlorobenzene: Causes local skin irritation leading to inflammation and burns.

Chloroform: Skin contact can cause blistering and contact with eyes causes tissue damage.

Chloroform: Skin contact can cause blistering and contact with eyes causes tissue damage.

1,2 dichlorobenzene: Eye contact can lead to cataracts.

1,2 dichloroethane: Eye contact causes corneal opacity.

Vinyl Chloride: Contact with liquified gas will cause frostbit and numbness and tingling of fingers and toes.

Arsenic: May cause eye irritation and inflammation. Prolonged skin contact can cause irritating redness and blisters.

#### 5.3.4 Skin Absorption

PCBs: Absorption is moderate, but can contribute significantly to all symptoms of long term exposure.

Phenols: Absorption through skin can cause severe systemic poisoning and death.

### 5.4 PHYSICAL HAZARDS

#### 5.4.1 Noise

Installation of 13 monitoring wells and 83 soil borings are planned and the use of heavy equipment used for these tasks will create a sharp rise in noise levels.

#### 5.4.2 Cold Stress

Initial site activities are planned for early fall with the remaining field work continuing into late fall. At that time of year, cold stress should not present a problem. However, if activities continue into the colder weather, there is an increased risk of weather-related cold stress conditions.

### 5.5 BIOLOGICAL HAZARDS

Because field activities are not expected to start until early/mid fall, the tic that causes lyme disease should not present a problem at that time of year unless warm weather persists extending the life cycle of this insect.

### 5.6 SAFETY HAZARDS

In addition to slip-trip hazards due to uneven terrain, heavy moving equipment (size and potential capability of moving parts) and additional vehicular traffic on the site and other off site physical

conditions may also produce further safety hazards. These can include weather, time of year and subsequent conditions of the wetlands area.

## 5.7 POTENTIAL RISK/LIKELIHOOD OF EXPOSURE

### 5.7.1 Chemical Agent Risk

The chemical contaminants of concern during this phase of the investigation are likely to pose a low to moderate potential of exposure to field personnel. The highest risk potential for exposure will be during well installation, soil boring activities and groundwater sampling. Results of laboratory analysis of samples taken during several previous investigations in the areas of proposed activities have indicated the presence of high levels of organic vapors in soil and groundwater.

The chemical contaminants at the Chemsol Site and in adjacent off-site areas were found in all matrices, i.e., soil, sediment, surface and groundwater. Field activities will include sampling of all these media. Several of the contaminants present are suspect carcinogens and PCBs and phenol also have a "skin" designation. Potential exposure to field personnel during sampling activities from the soil and groundwater containing PCBs, phenols, volatile organics and inorganics may be moderate.

Sampling of sediment and standing surface water should present a reduced risk of exposure to the volatiles and inorganics. However, risk of exposure via inhalation and skin contact to the soil containing PCBs and semi-volatiles remains moderately high. If the soil to be sampled is damp or wet, it will not present as high a dust hazard and the risk of inhalation exposure to the inorganics, volatiles and PCBs may also be reduced. There is a moderate to high potential of exposure (inhalation and skin contact) to the volatile organics during groundwater sampling. Installation of 13 new monitoring wells is planned. Due to the planned drilling procedure i.e., into the shallow and deep aquifers, depth of the borings and potential contamination in the groundwater, there is a moderate risk of exposure via inhalation to the volatile organics.

### 5.7.2 Physical Agent Risk

A potentially high risk of exposure to several types of physical hazards is expected during field activities. Changing seasonal conditions in the wetlands area include a variable water level, submerged rocks, trees, tree stumps and a potential for water snakes. Biting insects (including ticks), if the weather remains warm, can present a higher risk potential. Uneven sloping terrain can produce another potential physical hazard.

### 5.7.3 Safety Hazards

In addition to slip-trip hazards due to irregular terrain, the presence of the drill rigs and on-site vehicular traffic may produce a further safety hazard.

## 5.8 CONTROL MEASURES

Levels of protection have been assigned by task, sampling media, chemical toxicity and potential exposure. Provision to upgrade to Level C respiratory protection have been made for several tasks if contaminant levels in the breathing zone approach action levels, as noted on the direct reading monitoring instruments.

Action levels have been set conservatively for unknown contaminants in order to minimize/eliminate the risk of exposure to field personnel. Most sampling tasks will be performed using Level C protective equipment (PPE), i.e, polycoated tyvek, inner and outer gloves, disposable booties worn over field shoes or boots, both securely duct-taped to the tyvek coverall in order to prevent skin contact with the sampling media.

There are many volatile organics present in the groundwater. Because benzene was present in high concentration at one well (TW-5) and, to a lesser extent, this contaminant together with vinyl chloride was found at several other well locations, detector tubes specific for these carcinogens will be used at the "hot" wells. Wearing Level C respiratory protection, the wells will be opened by the HSC or designee and they will be allowed to vent prior to use of the detector tanks.

After opening, each well, levels of organic vapor contamination should be taken of the ambient air and the breathing zone and noted in the field log book using an organic vapor detector (PID and/or FID). These direct-reading instruments are non-specific and are used to measure levels of organic vapors only.

If detector tube measurements taken at the breathing zone at "hot" well locations do not reveal the presence of vinyl chloride or benzene, personnel shall, nonetheless, remain cautious and continue to monitor the breathing zone using the direct reading instruments for possible need to upgrade respiratory protection.

Detector tube use (benzene/vinyl chloride) should be repeated periodically during sampling of those specific "hot" wells to ensure the breathing zone is clear of these carcinogenic agents.

Phenol can be absorbed through the skin potentially causing severe systemic effects. Contact with PCBs will cause the chronic skin condition known as "chloracne" and contact with contaminant may contribute significantly to the health hazard. Safety glasses shall be worn during all sampling activities

to avoid eye contact with the contaminants, some of which can cause irritation and/or permanent eye damage.

Other methods of minimizing or eliminating risk of exposure include: strict adherence to designated levels of protection, practicing contamination prevention including a thorough washing of hands and face when exiting exclusion zones, prohibiting use of contact lenses during field activities and using gloves and safety glasses during handling of all decontamination solutions. Proper use and handling of decontamination solutions and avoid producing an unsafe on-site condition.

In addition, a reconnaissance of the wetlands prior to delineation and prior to sampling will be required to familiarize personnel with topography, depth of stream water and potential hazards. Field boots will be required during performances of these tasks. For all field personnel, strict adherence to the buddy system and line-of-sight will be mandatory as well as familiarization with emergency hand signals. If assigned to the soil boring and/or monitoring well locations, hard hats shall be worn during heavy equipment use. Hearing protection will be provided by the HSO and a dust suppressant will be used as needed.

Field personnel will remain aware at all times of the drilling and other heavy construction equipment that may be on site. All moving equipment shall have backup alarms (107dBA).

#### 5.9 Safe Work Practices During Sampling and Monitoring Well Installation

Water quality samples will be collected from both on-site and off-site monitoring wells.

##### Safe Work Practices:

1. Allow well to vent until levels are at background after opening and before purging. at "hot" wells. Personnel who perform this task shall do so in Level C respiratory protection.
2. Monitor the breathing zone and ambient air using a direct-reading organic vapor detector (FID/PID).
3. Use detector tubes specific for benzene and vinyl chloride. (Refer to Hazard Assessment)
4. Avoid skin contact with purge water.
5. Handle purge water in accordance with safe contamination prevention practices.
6. Task-designated protective equipment with outer gloves taped to tyvek will be worn during all sampling activities.



### 5.9.1 Surface Water and Sediment Sampling

Surface water and sediment samples will be collected from the near-bank area of the streams identified RI/FS Work Plan.

#### Safe Work Practices:

1. Person collecting samples will use the buddy system and "line of sight."
2. Task-designated protective equipment with outer gloves taped to tyvek will be worn during all sampling activities.

### 5.9.2 Soil Sampling

Soil samples will be collected from locations within Lot-1A and Lot-1B as shown in the RI/FS Work Plan.

#### Safe Work Practices:

1. Task-designated protective equipment with outer gloves taped to tyvek will be worn during all sampling activities.
2. Continuous monitoring of the breathing zone/ambient air, using an organic vapor detector (PID/FID). If contaminant levels in the breathing zone reach action levels, work will continue only if proper respiratory equipment is used.

### 5.9.3 Air Sampling

Air samples will be collected from both on-site and off-site locations during the RI/FS investigation.

#### Safe Work Practices:

1. Proper personal protective equipment shall be worn.
2. Continuous monitoring of the breathing zone/ambient air, using an organic vapor detector (PID/FID). If contaminant concentrations in the breathing zone reach action levels, work will continue only if proper respiratory equipment is used.

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#### 5.9.4 Monitoring Well Installation

During the RI/FS investigation, monitoring wells will be installed both on-site and off-site.

##### Safe Work Practices:

1. Task-designated protective equipment will be worn to avoid contact with soil and ground water.
2. Continuous monitoring of the breathing zone and ambient air using an organic vapor detector (PID/FID). If contaminant concentrations in the breathing zone reach action levels, work will continue only if proper respiratory equipment is used.

#### 5.9.5 Geophysical Investigation

Several wells will be geophysically logged during the RI/FS investigation.

##### Safe Work Practices:

1. Task-designated protective equipment should be worn to avoid contact with soil and ground water.
2. Continuous monitoring of the breathing zone and ambient air using an organic vapor detector (PID/FID). If contaminant concentrations in the breathing zone reach action levels, work will continue only if proper respiratory equipment is used.

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## 6.0 TRAINING

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### 6.1 HEALTH AND SAFETY ORIENTATION TRAINING

All CDM Federal and Subcontractor personnel involved with the investigation activities are required to have completed the 40-hour hazardous materials health and safety training as specified in 29 CFR 1910.120. This training, designed to orient personnel potentially exposed to hazardous substances, health hazards, or safety hazards, includes the following:

- Safety and health risk analysis;
- Use of personal protective clothing;
- Work practices by which the employee can minimize risks from hazards;
- Safe use of engineering controls and equipment;
- Medical surveillance requirements including recognition of symptoms and signs which might indicate overexposure to hazards;
- Procedures for environmental monitoring, site control and decontamination;
- General safety concepts; and
- Emergency response plans.

Personnel who have taken health and safety orientation training longer than one year prior to the start-up date will complete annual health and safety refresher training. Furthermore, personnel functioning independent of an immediate supervisor will have on-the-job training in the form of three days of actual field experience under a skilled supervisor.

### 6.2 SPECIALIZED TRAINING

All CDM Federal field personnel are to be knowledgeable in the particular hazards that may be encountered during this project and be familiar with safe operating procedures. Field personnel are also to be familiar with all emergency response procedures outlined in this safety plan. The Site Specific Health and Safety Coordinator will have additional training, including CPR, First Aid, and 8-hour hazardous materials on-site supervisory training. Subcontractors will be responsible for ensuring that their employees receive specialized training for their job functions and responsibilities.

## 6.3 PRE-INVESTIGATION HEALTH AND SAFETY BRIEFING

### 6.3.1 Site Hazards

CDM Federal and subcontractor personnel involved with the project will attend a site-specific health and safety training meeting. The topics to be discussed include:

- Characteristics and potential hazards of chemicals and other contamination known to be present at the site;
- Personal protective clothing: function, donning/doffing;
- Respirators: selection, use, care;
- Personal hygiene;
- Environmental monitoring;
- Decontamination procedures;
- Work zone designations;
- Heat stress/Cold stress;
- General safety concepts; and
- Site contingency plans.

### 6.3.2 Hazard Communication

CDM Federal has a written hazard communication program which was established to meet the requirements of 29 CFR 1910.1200, and field activities shall be implemented in accordance with that program, as described below.

A listing, noting the anticipated location of hazardous chemicals introduced by CDM Federal at the worksite, will be appended to this Health and Safety Plan (see Appendix A), and posted in the on-site trailer (if applicable) or command post. Material safety data sheets (MSDSs) for hazardous chemicals introduced to the site by CDM Federal will also be provided in Appendix A for review by all on-site personnel.

Labels on containers used by CDM Federal are as originally received (not to be defaced) and are to contain the following information: (1) the identity of the hazardous chemical(s); (2) the appropriate hazard warnings; and (3) the name and address of the chemical manufacturer. If an employee transfers chemicals from a labeled container to a portable container, a label which contains those three items must

be affixed to it. If the portable container is intended only for that employee's immediate use (during the same workshift), no labels are required. The employee will be responsible to properly empty, clean or dispose of the portable container immediately after use.

The Site Specific Health and Safety Coordinator shall make a reasonable effort to obtain the appropriate hazard communication information for hazardous chemicals introduced by other employers, including:

- Explanation of that firm's labeling system;
- The name and location of each hazardous chemical, and location of MSDSs;
- Any precautionary measures other employers need to take to protect their employees from harmful exposure to hazardous chemicals under normal operating conditions and in foreseeable emergencies.

As part of the site-specific health and safety orientation conducted by the Site Specific Health and Safety Coordinator, a review of the hazard communication program will be offered to inform employees of hazardous chemicals to which they may be exposed during field activities. Other employers may also attend this hazard communication training session. If the chemical hazard changes or a new chemical hazard is introduced into the area after work begins, additional training will be provided by the Site Specific Health and Safety Coordinator.

Site-specific hazard communication training for hazardous chemicals introduced to the site by CDM Federal will include:

- properties and hazards (chemical, physical, toxicological) of hazardous chemicals;
- health hazards, including signs and symptoms of exposure and any medical condition known to be aggravated by exposure;
- measures employees can take to protect themselves, including: appropriate work practices or methods for proper use and handling, procedures for emergency response, and the proper use and maintenance of personal protective equipment, as required.
- work procedures for employees to follow to protect themselves when cleaning hazardous chemical spills and leaks.
- use of the container labeling system and the MSDSs including: where MSDSs are located, how to read and interpret the information on both labels and MSDSs, and how employees may obtain additional hazard communication information.

Site-specific hazard communication training will also cover hazardous chemicals introduced by other employers and shall emphasize:

- information about the hazardous chemicals to which CDM Federal's employees may be exposed;
- an explanation of the labeling system other employers are using;
- information about the precautionary measures CDM Federal employees need to take to protect themselves during normal operating conditions and in emergencies;
- location of MSDSs for hazardous chemicals brought to the site by other employers.

The Site Specific Health and Safety Coordinator shall document the training, including the agenda and list of attendees.

This subsection of the Health and Safety Plan, and the hazard communication training conducted as described above, shall be the mechanism for informing other employers planning to be on-site of hazardous chemicals introduced to the site by CDM Federal.

#### 6.4 MORNING SAFETY MEETINGS

Morning Safety and Health briefings will be conducted by the Site Specific Health and Safety Coordinator. Problems relative to respiratory protection, inclement weather, heat/cold stress, or the interpretation of newly available environmental monitoring data are examples of topics which might be covered during these briefings. An outline report of meetings giving the date, time, attendees, subjects discussed, and instructor shall be maintained and copies furnished to the designated authority on request. Visitors will be properly oriented to existing site conditions, planned activities, levels of personal protection, and other procedures outlined in this SSHSP.

## 7.0 MEDICAL SURVEILLANCE AND EXPOSURE MONITORING

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### 7.1 MEDICAL SURVEILLANCE

CDM Federal and subcontractor personnel, whose work may involve potential chemical exposure or present unusual physical parameters, will have initial employment, annual, and employment termination examinations. Medical evaluations will be performed by an approved occupational physician in accordance with the ARCS II Contract. Subcontractors are required to meet medical surveillance requirements for this project.

7.1.1 Purpose - The purposes of the medical evaluation are to: 1) determine fitness for duty on hazardous waste sites; and 2) establish baseline data for future reference. Such an evaluation is based upon the employee's occupational and medical history, a comprehensive physical examination, and an evaluation of the ability to work while wearing protective equipment. The medical examination must include an OSHA-type evaluation of the workers' ability to use respiratory protective equipment.

7.1.2 Supplemental Examinations - Supplemental examinations may be performed whenever there is an actual or suspected excessive exposure to chemical contaminants or upon experience of exposure symptoms, or following injuries or temperature stress.

7.1.3 Medical Certification - Medical certification records will be kept for all CDM Federal personnel. The SHSC will obtain and keep documents from subcontractors indicating medical clearance for subcontractor personnel.

### 7.2 EXPOSURE MONITORING

Whenever feasible, the level of protection established for workers will be based upon quantitative determinations of the chemical agents and physical stresses present in the work environment. It is expected that the work will be conducted during the fall and winter months, therefore, cold exposure is of concern.

### 7.2.1 Cold Exposure

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 a 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°F with a wind of 15 mph is equivalent in chilling effect to still air at -18°F. As a general rule, the greatest incremental increase in wind chill occurs when a wind of five mph increases to ten mph.

Water conducts heat 240 times faster than air. Thus, the body cools suddenly when chemical-protective equipment is removed if the clothing underneath is soaked with perspiration. Types of cold exposure include:

1. Frost nip or incipient frostbite. The condition is characterized by sudden blanching or whitening of the skin.
2. Superficial frostbite. Skin has a waxy or white appearance and is firm to the touch, but tissue beneath is resilient.
3. Deep frostbite. Tissues are cold, pale, and solid; extremely serious injury.

Systemic hypothermia is caused by exposure to freezing or rapidly dropping temperature. Its symptoms are usually exhibited in five stages: (1) shivering, (2) apathy, listlessness, sleepiness and (sometimes) rapid cooling of the body to less than 95°F, (3) unconsciousness, glassy stare, slow pulse and slow respiratory rate, (4) freezing of the extremities, and finally, (5) death. Detailed information about the types and symptoms of hypothermia is included in Appendix C.

### 7.2.2 Heat Stress

Heat stress is probably one of the most common and potentially serious illnesses at hazardous waste sites. The potential for heat stress is dependent on a number of factors, including environmental conditions, clothing, workload, physical conditioning, and age. The effects of heat stress can range from mild symptoms, such as fatigue, irritability, and decreased mobility, to death. The body's response to



heat stress include the following:

- Heat Rash: A result of continuous exposure to heat and humidity, heat rash decreases the body's ability to tolerate heat.
- Heat Cramps: A result of profuse perspiration with inadequate fluid intake and chemical replacement, heat cramps are signaled by muscle spasms and pain in the abdomen and the extremities.
- Heat Exhaustion: A result of increased stress on various organs. The signs of heat exhaustion include shallow breathing; pale, cool, moist skin; profuse sweating; dizziness and lassitude.
- Heat Stroke: The most severe form of heat stress, heat stroke must be relieved immediately to prevent severe injury or death. The signs of heat stroke are red, hot, dry skin; no perspiration; nausea; dizziness and confusion; strong, rapid pulse; coma. The body must be cooled and medical attention sought immediately.

Preventive measures to preclude heat stress include regular work breaks during field activity, regular fluid replenishment, and the availability of shelter (i.e. shaded area). All personnel will be made aware of the symptoms of heat stress. Should one or more symptoms be detected, the affected worker will be assisted to seek shade, drink plenty of fluids, and seek medical attention, if required.

Heat stress monitoring of all personnel will commence when the ambient temperature in the work areas is above normal room temperature. A standard mercury-in-glass thermometer will be available on site to measure air temperature. As indicated in Table 7-1, the frequency of heat stress monitoring will govern the length of each work cycle.

Several screening techniques can be used to detect early warning signs of heat stress. The following method, based on body temperature measurements, is simple and straightforward and may be conducted by the Site Specific Health and Safety Coordinator as indicated. Body temperature will be measured with a digital-readout clinical thermometer with disposable tips.

Body temperature may be measured orally (3 minutes under the tongue) with a clinical thermometer at the end of each work period and before drinking. Oral temperature at the end of the work period should not exceed 99.6°F. If it does, the next work period should be shortened by 10 minutes (or 33%), while the length of the rest period stays the same. However, if the oral temperature exceeds 99.6°F at the beginning of the next rest period, the following work cycle should be further shortened by 33%. Oral temperature should be measured again at the end of the rest period to make sure that it has dropped below 99.6°F. No worker may be permitted to continue wearing semipermeable or impermeable garments when his/her oral temperature exceeds 100.6°F.

TABLE 7-1  
 FREQUENCY OF HEAT STRESS MONITORING<sup>a,b</sup>

<u>Adjusted Temperature<sup>c</sup></u>	<u>Normal Work Ensemble<sup>d</sup></u>	<u>Impermeable Ensemble</u>
90°F (32.2°C) or above	After each 45 minutes of work	After each 15 minutes of work
87.5°-90°F (30.8°-32.2°C)	After each 60 minutes of work	After each 30 minutes of work
82.5°-87.5°F (28.1°-30.8°C)	After each 90 minutes of work	After each 60 minutes of work
77.5°-82.5°F (25.3°-28.1°C)	After each 120 minutes of work	After each 90 minutes of work
72.5°-77.5°F (22.5°-25.3°C)	After each 150 minutes of work	After each 120 minutes of work

- a Source: Occupational Safety and Health Guidance Manual for Hazardous Waste Site Activities, NIOSH/OSHA/USCG/USEPA, 1985.
- b For work levels of 250 kilocalories/hour.
- c Calculate the adjusted air temperature ( $t_{a \text{ adj}}$ ) by using this equation:  $t_{a \text{ adj}} \text{ } ^\circ\text{F} = t_a \text{ } ^\circ\text{F} + (13 \times \% \text{ sunshine})$ . Measure air temperature ( $t_a$ ) with a standard mercury-in-glass thermometer, with the bulb shielded from radiant heat. Estimate percent sunshine by judging what percent time the sun is not covered by clouds that are thick enough to produce a shadow. (100 percent sunshine = no cloud cover and a sharp, distinct shadow; 0 percent sunshine = no shadows.)
- d A normal work ensemble consists of cotton coveralls or other cotton clothing with long sleeves and pants.

## 8.0 ENVIRONMENTAL MONITORING

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The following monitoring instruments will be used during field investigation to monitor all field personnel especially those with the likelihood of greatest exposure:

- HNu Model PI 101 photoionization detector fitted with a 17.7 eV lamp, and
- OVA - 128 flame ionization detector.
- Particulate sampler (i.e., Miniram)

All monitoring equipment will be protected from surface contamination during use to allow easy decontamination. All instrumentation will be calibrated daily before use; periodic calibration checks will be made and documented in the field by the SHSC over the duration of the field activities.

Action levels associated with organic vapor readings, must be considered in concert with other site conditions in triggering the need for respiratory protection, and are as follows:

- Level C - Concentration of vapors/gases in the breathing zone ranging from background to 2-5 ppm above background (TWA).
- Level D - Concentration of vapors/gases in the breathing zone ranging from 0-2 ppm above background (TWA).

The above action levels are non-benzene/non-vinyl chloride atmospheres. Refer to the Hazard Assessment for further clarification.

The action levels apply to sustained (5 minutes) readings above background in the breathing zone of personnel conducting field investigative activities. The levels are based on EPA's rationale for relating total atmospheric vapor/gas concentrations to the selection of the level of personal protection as provided in the EPA Standard Operating Safety Guides.

After initial daily screening, visual judgement will be used to determine when monitoring with a dust meter (i.e. Miniram) should be used. The OSHA PEL for respirable particulates is 5 mg/m<sup>3</sup>.

## 9.0 SITE CONTROL

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A daily log containing the names of personnel, site entry and exit times, and their levels of personal protection shall be maintained by the Site Health and Safety Coordinator. The daily log shall also include all information and times associated with monitoring for heat/cold stress, calibration of air monitoring instrumentation, and any health-related symptoms noticeable among the workers.

### 9.1 ACCESS/EGRESS

Emergency egress is generally limited to Fleming Street (Figure 9-1).

### 9.2 WORK ZONES

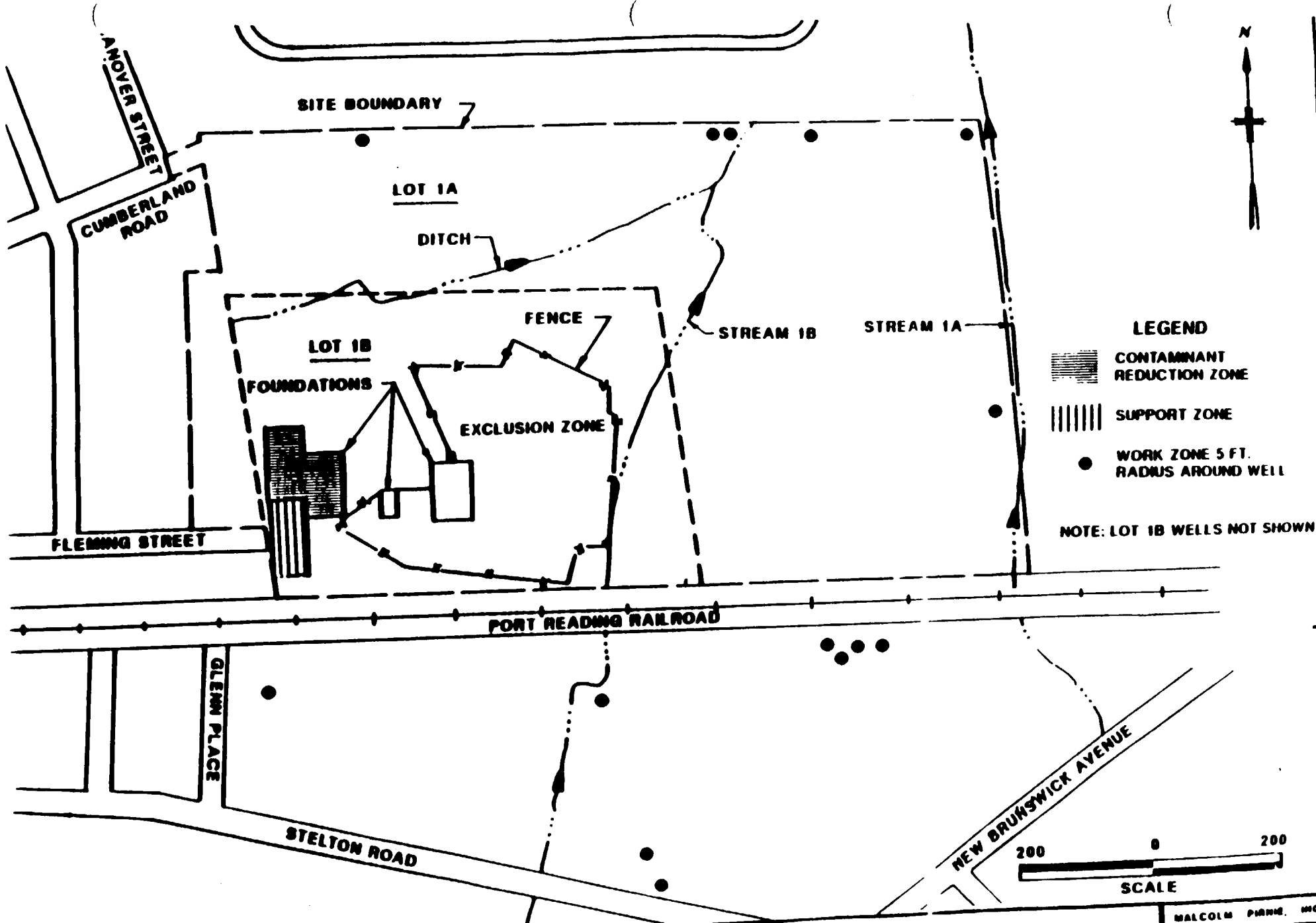
Site personnel shall clearly layout and identify work zones in the field as shown in Figure 9-1 and shall limit equipment, operations and personnel in the zones as described in EPA Standard Operating Safety Guides.

- Exclusion Zone. The entire Lot 1B shall be designated as an exclusion zone. Any activities performed in this zone shall be performed with the proper personal protective equipment as indicated in Section 11-1. At a minimum, Level D clothing and latex boots must be worn in this area. No eating, drinking or smoking will be allowed in this zone.

Additional protective equipment such as respirators, gloves and eye-protection will be dependent on specific field activities being performed or site conditions evaluated by the Site Specific Health and Safety Coordinator. Activities requiring additional levels of personal protection include: ground water sampling, soil sampling, surface water sampling, well installation and sediment sampling.

During off-site or Lot 1A ground water sampling and well installation, the designation of the work zone will be dependent upon which well/boring is being sampled. During sample collection, a five foot radius circle around the monitoring well or boring will be the designated work area. A plastic drop cloth will be used to eliminate contact between potential contaminated ground surface and clean sampling equipment and containers.

The level of personnel protective equipment required in these work zones shall be in accordance with the requirements specified in Section 11-1 as a minimum or as determined by the Site Specific Health and Safety Coordinator.



CHEMSOL, INC.  
 PISCATAWAY, NEW JERSEY  
**WORK ZONES**

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MALCOLM PIRNIE, INC.

FIGURE 9-1

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- **Contamination Reduction Zone.** This Zone shall occur at the interface of Exclusion and Support Zones and will be the area designated for the decontamination of personnel and clothing prior to entering the Support Zone, and for the physical segregation of the Support and Exclusion Zones. The level of personnel protective equipment required in this zone shall be in accordance with the requirements specified in Table 11-1 as a minimum or as determined by the Safety Coordinator after monitoring and on-site inspection. No eating, drinking or smoking will be allowed in this zone.
  
- **Support Zone.** This Zone will be established on the Site and is defined as the area outside the zone of significant contamination. The Support Zone shall be clearly delineated and shall be secured against active or passive contamination from the work site. No personnel protective equipment shall be required in this zone. Eating, drinking and smoking will be allowed only in this Zone.

The function of the Support Zone is to provide:

- An entry area for personnel, material and equipment to the Exclusion Zone.
- An exit area for decontaminated personnel, materials and equipment from the Contamination Reduction Zone.
- An area for location of Support Area facilities; and
- A storage area for clean safety and work equipment.

Decontamination of personnel will be performed as outlined in Section 12.1 before entering the Support Zone. Access of non-essential personnel to the Exclusion and Contamination Reduction Zones will be strictly controlled. Only personnel who are essential to the completion of the task will be allowed access to these areas and only if they are wearing the prescribed level of protection. Entrance of non-contractor or subcontractor personnel must be approved by the Site Safety and Health Coordinator.

### 9.3 COMMUNICATION

Communication from the site will occur through use of a telephone located in the on-site trailer.

## 10.0 SAFE WORK PRACTICES

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The understanding of basic, precautionary concepts regarding personal health and safety is essential for field personnel assigned to sites where chemical contamination is known or suspected to be present. At a minimum the safe work practices to be detailed shall include:

- The number of personnel and equipment on the site shall be minimized, consistent with effective site operations.
- On-site personnel shall use the "buddy" system. No one may work alone, i.e., out of earshot or visual contact with other workers.
- Site activities will be performed to minimize dust production and soil disturbance. As necessary, a dust suppressant shall be used.
- Contact with surfaces/materials either suspected or known to be contaminated will be avoided to minimize the potential for transfer to personnel, the need for decontamination and cross contamination.
- All work areas shall be lighted to not less than 5 foot candles.
- Eating, drinking, chewing gum or tobacco, smoking, or any practice which increases the probability of hand-to-mouth transfer of contaminated material is strictly prohibited in the work area outside the designated clean zone.
- The hands and face must be thoroughly washed upon leaving the work area and prior to engaging in any activity indicated above.
- Medicine and alcohol can potentiate the effects of exposure to toxic chemicals. Due to possible contraindications, use of prescribed drugs by CDM Federal personnel should be reviewed with the CDM Federal occupational physician. Alcoholic beverage and illegal drug intake are strictly forbidden during site work activities.
- Any respiratory protective equipment and clothing must be worn by personnel as outlined in this SSHSP. Excessive facial hair (i.e., beards, long mustaches or sideburns), which interferes with the satisfactory respirator-to-face seal is prohibited.
- When it is necessary for a visitor to observe the field work, that person will be issued appropriate personal protective equipment, briefed on potential hazards, safety practices, decontamination procedures and site communications. Respiratory equipment and proof of training/fit testing and medical surveillance, etc. must be supplied by all site visitors to the Site Specific Health and Safety Coordinator.
- All employees have the obligation to report unsafe work conditions.

## 11.0 PERSONAL PROTECTIVE EQUIPMENT

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### 11.1 GENERAL PROTECTION LEVELS

Personnel must wear protective equipment when work activities involve known or suspected atmospheric contamination; when vapors, gases, or particulates may be generated; or when direct contact with dermal active substances may occur. Respirators can protect the lungs, the gastro-intestinal tract and the eyes against air toxicants. Chemical-resistant clothing can protect the skin from contact with skin-destructive and skin absorbable chemicals. Good personal hygiene limits or prevents the ingestion of materials.

Equipment designed to protect the body against contact with known or anticipated chemical hazards has been divided into two categories according to the degree of protection afforded:

- Level C: Should be selected when the types of airborne substances are known, the concentrations have been measured and the criteria for using air-purifying respirators are met.
- Level D: Should not be worn on any site where respiratory or skin hazards exist. This is primarily a work uniform providing minimal protection.

The level of protection selected is based primarily on:

- types and measured concentrations of the chemical substances in the ambient atmosphere and their associated toxicity; and
- potential or measured exposure to substances in air, splashes of liquids or other indirect contact with material due to the task being performed.

In situations where the types of chemicals, concentrations, and possibilities of contact are not known, the appropriate level of protection must be selected based on professional experience and judgement until the hazards may be further characterized. The individual components of clothing and equipment must be assembled into a full protective ensemble to protect the worker from site-specific hazards, while at the same time minimizing hazards and drawbacks of the personal protective gear itself. Ensemble components outlined in the following subsection are based on the widely used EPA Levels of Protection.



**In general:**

- All protective head gear shall meet the requirements of the American National Standards Institute (ANSI) Z89.1, Class A or ANSI Z89.2, Class B.
- Persons will be provided with eye and face protective equipment when machines or operations present potential eye or face injury from physical, chemical or radiological agents. Eye and face protective equipment shall meet the requirements in ANSI Z87.1, Practice for Occupational and Educational Eye and Face Protection.
- Persons requiring corrective lenses in eyeglasses, when required by this regulation to wear eye protection, will be protected by one of the following:
  - Eyeglasses whose protective lenses provide optical correction;
  - Goggles that can be worn over corrective lenses without disturbing the adjustment of the spectacles; or
  - Goggles that incorporate corrective lenses mounted behind the protective lenses.
- Use of contact lenses will be prohibited. Contact lens use will not be permitted under a full-face respirator. Spectacle kits for insertion into full-face respirator will be provided for CDM Federal personnel as required.
- If increasing noise levels are encountered due to use of heavy equipment, the Site Health and Safety Coordinator will provide hearing protection.
- Persons handling rough, sharp-edged, abrasive materials or where the work subjects the hand to lacerations, punctures, burns, or bruises will use general purpose outer hand protection in addition to the chemical resistant inner and outer gloves specified in Table 11-1.
- Employees will wear clothing suitable for the weather and work conditions. The minimum will be long sleeve shirt, long trousers, and protective work shoes or boots. Protective steel-toed footwear are to be worn by all persons who are engaged in field work at this site, per EPA's Standard Operating Safety Guidelines.
- Respiratory protection approved by NIOSH/MSHA shall be provided for all employees subject to harmful concentrations of dusts, gases, fumes, mists, toxic materials, or atmospheres deficient in oxygen.
- Air purifying respirators will be permitted only where the toxic content of the air is known to be of type and concentration which the mask will effectively remove.
- Personal protective equipment will be inspected regularly and maintained in serviceable and sanitary condition, and before being reissued to another person or returned to storage, will be cleaned, disinfected, inspected, and repaired.

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## 11.2 REQUIRED LEVEL OF PROTECTION

The required levels of protection, based upon current information regarding the contaminants present at the Chemsol site and the various tasks to be completed during the investigation, are outlined in Table 11-1. The procedures outlined in this manual are operable during field activities conducted during the Chemsol RI/FS.

TABLE 11-1 REQUIRED LEVELS OF PERSONAL PROTECTION					
Task	Personal Protective Clothing and Equipment				
	Respiratory <sup>1</sup>	Clothing	Gloves <sup>2</sup>	Outer Boots <sup>3</sup>	Modifications
Field Management	D	D	--	L/N	
Safety and Health Surveillance	D	D	--	L/N	
Air Monitoring/Sampling	D	D	--	L/N	
Soil Sampling	C/D	D	L/Ni	L/N	Safety Glasses/ Face Shield
Well Installation	D/C	D	L/Ni	L/N	
Geophysical Investigation	D	D	--	L/N	
Ground Water Sampling					
On-Site wells	C/D	C	L/Ni	L/N	Safety Glasses/ Face Shield
Off-site wells	D	D	L/Ni	L/N	
Pumping Test	C/D	D	L/Ni	L/N	
Surface Water/ Sediment Sampling	D/C	D	L/Ni	L/N	
Site Preparation/ Reconnaissance	D	D	--	L/N	
D = Work Uniform    L = Latex    Ni = Nitrile					
N = Neoprene        C = Respirator (See Note 1 Below)					
Notes:					
1. All Activities at the site involving ground water shall be conducted in Level C respiratory protection with full-face, air purifying respirations, equipped with combination organic vapor/dust, fumes and mists cartridges. Should organic vapor levels measured by the organic vapor detector exceed background to 5 units, the Site Safety and Health Coordinator is authorized to stop work. Re-entry shall not be permitted without consultation with the MPI Project Manager and Health and Safety Program manager. Should dry dusty conditions exist, the Site Safety and Health Coordinator shall upgrade the level of respiratory protection to Level C. All personnel shall have three respirators available and current medical certification and documentation of successful fit test must be verified by the Site Safety and Health Coordinator.					
2. Outer and inner gloves shall also be used whenever handling site soil due to the possible presence of PCBs.					
3. Work uniform will include safety shoes or boots with steel toes and shanks. Protective clothing will include latex boot covers over safety shoes or neoprene boots with steel toes and shanks.					

CHM 001 0513

## 12.0 DECONTAMINATION

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### 12.1 PERSONNEL DECONTAMINATION

The degree of decontamination required is a function of both a particular activity and the physical environment within which it takes place. Decontamination procedures will be as described below. Further, all on-site activities will be carried out in such a manner as to avoid contamination of personnel, protective equipment, tools and machinery.

Decontamination for the investigative activities will take place in the area designated as the Contamination Reduction Zone. The area will be clearly marked with flagging tape to separate it from the Support Zone and the Exclusion Zone. Personnel egress to and from these sites will be limited. This will minimize the potential spread of contaminated material to clean areas.

Under no circumstances is a potentially-contaminated person to exit the site by any means other than through Contamination Reduction Zone. Upon leaving the site for lunch break or at the end of each work shift, personnel will be required to remove all contaminated protective clothing/equipment. Upon completion of work activities, at each time of break, or at the end of each work shift, the work crew will proceed toward the designated decontamination area. To the extent practical, equipment will remain in the Exclusion Zone. A large plastic sheet will be placed on the ground in the Contaminant Reduction Zone. Disposable towels will be used to contain spilled and splashed water. Prior to removal, boot covers or boots and outer gloves will be washed in large tubs with a soap and water solution (i.e. Alconox), rinsed with fresh water, and removed. A bristle brush will be used to remove gross soil contamination. A pump sprayer will be utilized for each rinse station. Wash and rinse waters will be contained in storage tanks and ultimately disposed of with contaminated purged ground water.

Unsoiled or decontaminated disposable protective equipment will be disposed of as regular trash. Grossly contaminated equipment and water used for decontamination will be drummed and staged securely for prior to disposal.

### 12.2 DECONTAMINATION OF FIELD EQUIPMENT

When equipment must be removed from the Exclusion Zone, decontamination procedures shall be performed in the Contamination Reduction Zone similar to the personnel decontamination described above. The equipment will be wiped and brushed using soapy water, rinsed using fresh water, and then dried with a disposable paper towel.

### 12.3 DECONTAMINATION FOR MEDICAL EMERGENCIES

In the event of a minor, non-life threatening injury, personnel should follow the decontamination procedures as outlined above, and then administer first-aid.

In the event of a major injury or other serious medical concern, immediate first-aid is to be administered in lieu of further decontamination efforts unless the environmental conditions would be considered "Immediately Dangerous to Life or Health," in which case all personnel shall evacuate the site.

## 13.0 EMERGENCY RESPONSE PLAN

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### 13.1 PRE-EMERGENCY PLANNING

Morning Safety and Health meetings will be conducted to discuss potential problems on a day-to-day basis. Problems relative to respiratory protection, inclement weather, heat/cold stress, or the interpretation of newly available monitoring data are examples of topics which might be identified during these meetings.

### 13.2 EMERGENCY RECOGNITION AND PREVENTION

As a result of any problems identified at Morning Safety and Health meetings, daily schedules and procedures would be modified accordingly.

### 13.3 EMERGENCY EQUIPMENT

Emergency equipment will be readily accessible and distinctly marked. CDM Federal and subcontractor personnel will be familiar with the location and trained in the use of emergency equipment. Emergency equipment that will be available on-site includes:

#### Fire Extinguishers

- One Class A, B dry chemical fire extinguisher will be located in the Contamination Reduction Zone.
- The fire extinguisher will be inspected, serviced, and maintained in accordance with the manufacturer's instructions. As a minimum, all extinguishers shall be checked monthly and weighed semi-annually, and recharged if necessary.
- Immediately after each use, the fire extinguisher will be either recharged or replaced.
- The fire extinguisher will be suitably placed, distinctly marked, and readily accessible.

First Aid Kits - First Aid Kits will conform to Red Cross and other applicable good health standards, and shall consist of a weatherproof container with individually-sealed packages for each type of item. First Aid Kits will be fully equipped before being sent out on each job and will be checked

weekly by the Site Specific Health and Safety Coordinator to ensure that the expended items are replaced. First Aid Kits will be suitably placed, distinctly marked, and readily accessible.

Eye Wash - In the event of contamination by dust particles during any remedial activity, an emergency eye wash will be available in the CRZ during all field activities. In such an emergency, the eye will be immediately flushed with large amounts of water, occasionally lifting the lower and upper lids. Professional medical attention should be sought if necessary. Emergency eye wash containers will be distinctly marked and located in areas known to all field personnel. The emergency eye wash will meet minimum requirements of ANSI Z358.7.

#### 13.4 COMMUNICATIONS

The on-site trailer will contain a telephone for outside communications. Two-way radios will be made available for communication with the Command Post. Personnel will familiarize themselves with hand signals for emergency use.

#### 13.5 SITE SECURITY AND CONTROL

Portions of the site are fenced and locked. The majority of the site, however, is unfenced and generally wooded, which makes it difficult to see personnel and control access. Anyone visiting the site will be recorded and informed of potential hazards. Visitors will be restricted to the support zone.

#### 13.6 PERSONAL PROTECTION EQUIPMENT

The required levels of protection, based upon current information regarding the contaminants present at the site and the various tasks to be completed during the investigation, are outlined in Section 11.0.

weekly by the Site Specific Health and Safety Coordinator to ensure that the expended items are replaced. First Aid Kits will be suitably placed, distinctly marked, and readily accessible.

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The on-site trailer will contain a telephone for outside communications. Two-way radios will be made available for communication with the Command Post. Personnel will familiarize themselves with hand signals for emergency use.

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The required levels of protection, based upon current information regarding the contaminants present at the site and the various tasks to be completed during the investigation, are outlined in Section 11.0.

### 13.7 EMERGENCY MEDICAL TREATMENT

In the event of a serious medical emergency, victims shall be treated at the Robert Woods Johnson Medical Center. The Emergency Room Supervisor should be contacted in the case of a serious medical emergency for determination of the appropriate mode of transportation (i.e., by personal vehicle, ambulance, or ambulance after on-site treatment by paramedics). The hospital will be contacted and briefed on the situation, the potential hazards, and the substances involved. In addition, the Piscataway Township Police Department will be fully apprised of the proposed remediation activities. Written directions and map of the route to the hospital, provided as Figure 13-1, shall be posted at the site during all activities.

### 13.8 PERSONAL INJURY

In the event of personal injury, emergency first-aid will be applied on site as deemed necessary. The individual will be decontaminated as appropriate and transported to the Robert Woods Johnson Medical Center (Medical Center) if needed. During all field activities, at least one person on the site will be certified in First Aid and CPR. The SHSC will complete the appropriate incident report.

### 13.9 PERSONNEL EXPOSURE

- Skin Contact: Use copious amounts of soap and water. Wash/rinse affected area for at least 15 minutes. Eye wash stations will be provided on site. If necessary, transport to the Medical Center.
- Inhalation: Move to fresh air and, if necessary, transport to the Medical Center.
- Ingestion: Decontaminate and transport to the Medical Center.

### 13.10 ENVIRONMENTAL ACCIDENT (SPREAD OF CONTAMINATION)

If an Immediately Dangerous to Life or Health (IDLH) atmosphere does not exist and adequate personal protective equipment is being used, secure spread of contamination whenever possible. The Site Manager and the Site Specific Health and Safety Coordinator will be notified. Other appropriate emergency response groups and management will be notified as necessary by the Site Specific Health and Safety Coordinator. The Site Specific Health and Safety Coordinator or Site Manager will also determine



Hospital:

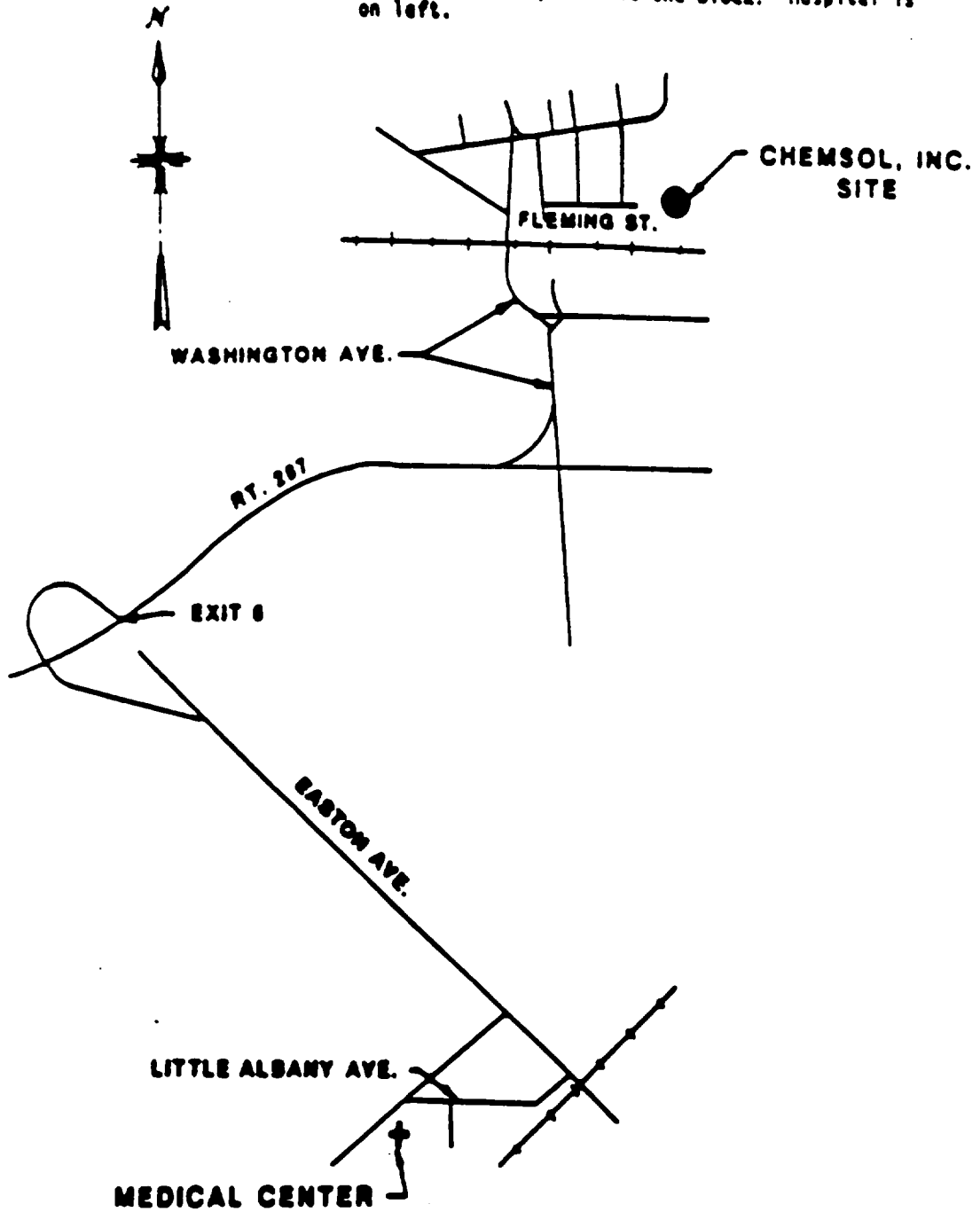
Robert Wood Johnson Medical Center  
1 Robert Wood Johnson Place  
New Brunswick, NJ 08901

Telephone:

(201) 828-3000

Directions from site:

Drive west from site to the end of Fleming Street. Turn right. Make first left. Make next left onto Washington Avenue. Make second right to continue on Washington Avenue. to Route 287 interchange. Take Route 287 west to exit 6 (Easton Avenue - New Brunswick). Take Easton Avenue south into New Brunswick. Make right turn at Little Albany Avenue (just before overhead railroad tracks). Drive one block. Hospital is on left.



CHM 001 0520

FIGURE 13-1

NOT TO SCALE

whether an evacuation of the immediate areas is necessary and will announce that decision. If possible, personnel should leave the area through the Contamination Reduction Zone. If this is not possible, personnel should leave via the shortest route possible.

### 13.11 PROCEDURES TO CRITIQUE THE RESPONSE

In the event that an emergency response is required, meetings would occur after the event to discuss possible methods to enhance, modify or improve the effectiveness of the response. This would occur regardless of the severity of the event and the relative effectiveness of a given response.

### 13.12 GENERAL SITE CONDITIONS

The topography of the site is relatively uniform and flat. Site activity in the past was restricted primarily to the unwooded southwest portion of the site. Winds are generally from the west-northwest during the winter and southwest during the summer. Work on the site is anticipated to begin during the month of October 1992 and continue through June 1993.

### 13.13 ADVERSE WEATHER CONDITIONS

In the event of adverse weather conditions, the Site Manager will determine if work can continue without sacrificing the health and safety of workers. Some of the items to be considered prior to determining if work should continue are:

- Potential for heat stress or cold stress;
- Inclement weather-related working conditions;
- Limited visibility;
- Potential for electrical or dust storms.

#### 13.14 EMERGENCY NUMBERS

The telephone numbers listed on Table 13-2 will be available on-site at all times in case of emergency.

#### 13.15 EMERGENCY PLAN

The SHSC will inform the local Emergency Response Units about the nature and duration of work expected on the site and the type of contaminants and possible health or safety effects of emergencies involving these contaminants prior to startup of site activities.

The Site Specific Health and Safety Coordinator shall implement the emergency plan whenever conditions at the site warrant such action. The Health and Safety Coordinator will be responsible for assuring the evacuation, emergency treatment, emergency transport of site personnel as necessary, and notification of emergency response units and the appropriate staff.

#### 13.16 EVACUATION

In the event of an emergency evacuation, such as fire, explosion, significant release of toxic gases, etc.; an air horn or other appropriate device will be sounded for approximately 10 seconds indicating the initiation of evacuation procedures. All personnel in both the restricted and nonrestricted areas will evacuate and assemble near the Support Zone, upwind of the problem source. For efficient and safe site evacuation and assessment of the emergency situation, the SHSC will have authority to initiate proper action if outside services are required. Under no circumstances will incoming personnel or visitors be allowed to proceed into the area once the emergency signal has been given. Once the safety of all personnel is established, the appropriate emergency response groups will be notified by telephone of the emergency. The site evacuation plan shall be reviewed as part of the overall training program for site operations.

TABLE 13-2

EMERGENCY TELEPHONE NUMBERS

Robert Wood Johnson Medical Center 1 Robert Wood Johnson Place New Brunswick, NJ 08901	(908) 828-3000
Piscataway Township Police Department 555 Sidney Road Piscataway, NJ 08854	(908) 562-1100
Arbor Rescue Squad 1790 W. Seventh Street Piscataway, NJ 08854	(908) 968-6458
New Market Fire Department 801 So. Washington Avenue Piscataway, NJ 08854	(908) 752-5161
Piscataway Health Department 455 Hoes Lane Piscataway, NJ 08854 (open 8:30 - 4:30)	(908) 562-2323
Middlesex County Health Department 417 Dennison Street Highland Park, NJ 08904 (open 8:30 - 4:15)	(908) 828-8100
Poison Control Information (Poison Control Center)	1-800-962-1253
Hazardous Material Emergency (USEPA National Response Center)	1-800-424-8802

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## 14.0 RECORD KEEPING

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It will be each employer's responsibility to establish and assure adequate records for personnel including:

- Medical examination and certificates.
- Hazardous materials health and safety training.
- CPR and first aid training.
- Exposure work-hours and a log of occupational injuries and illness.
- Accident investigations.
- Daily record of all first-aid treatments not otherwise reportable.
- Injuries or illness reports to insurance carrier or state compensation agencies.
- Related reports required by the client.
- Related record and reports required by Local, State, and Federal agencies.
- Related correspondence.

In the event of any accident/incident, the Site Health and Safety Coordinator will notify the Project Manager and the Regional Health and Safety Supervisor as soon as possible following the event. All accidents will be investigated, reported, and analyzed. Injured persons are responsible for reporting all injuries as soon as possible to the Site Health and Safety Coordinator.

CHM 001 0524

# 15.0 MEDICAL DATA SHEET/FIELD TEAM REVIEW

This brief Medical Data Sheet will be completed by all on-site personnel and will be kept in the Support Zone during ongoing site operations. It is in no way a substitute for the Medical Surveillance Program requirements consistent with the CDM FPC Health and Safety Program for Hazardous Wastes Sites. This data sheet will accompany any personnel when medical assistance or transport to hospital facilities is required. If more information is required use the back of this sheet.

Project: Chemsol, Inc.

Name: \_\_\_\_\_ Employee SS No.: \_\_\_\_\_

Address: \_\_\_\_\_ Home Telephone: \_\_\_\_\_

Age: \_\_\_\_\_ Height: \_\_\_\_\_ Weight: \_\_\_\_\_

Emergency Contacts (List 2):

\_\_\_\_\_ Telephone: \_\_\_\_\_

\_\_\_\_\_ Telephone: \_\_\_\_\_

Allergies/Drug Sensitivities: \_\_\_\_\_

Do you wear contacts? \_\_\_\_\_

List any illness that was a result of known chemical-exposure:

\_\_\_\_\_

Have you been hospitalized as a result of a known chemical exposure?

Data/Hospital/Length of Stay: \_\_\_\_\_

What medications/drugs are you presently using?

\_\_\_\_\_

Name of Personal Physician: \_\_\_\_\_

Telephone: \_\_\_\_\_

I have reviewed the Interim Health and Safety Plan, understand the information contained therein and will comply with all provisions.

Name: \_\_\_\_\_

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

Site/Project: \_\_\_\_\_

**APPENDIX A**  
**CHEMICAL DATA SHEETS**

CHM 001 0526

**CHEMICAL DATA SHEET**I. Chemical/Compound Name: 1,2-DichloropropaneA. Synonyms: Propylene dichloride, Dichloro - 1,2-propaneB. CAS #: 78-87-5 (1976)

II. Physical Characteristics

A.  Liquid  Solid  Powder  GasB. Color: ColorlessC. Odor: Chloroform-like, sweetD. LEL: 3.4 %Flash Pt.: 60 °FE. Boiling Point: 206 °FMelting Point:     °FIonization Potential: 10.87evF. Other: Detection Level - not available

III. Recommended Air Purifying Cartridge:

 Dusts, Fumes, Mists Acid Gases Organic Vapors Pesticides HEPA Air Purifying is Inappropriate Ammonia/Amines Other

IV. Health Hazards Data

A. Routes of Entry:  Inhalation  Skin Absorption  IngestionB. OSHA Listed Carcinogen:  No  Suspect  YesC. Sensitizer:  No  No Data  Suspect  Yes

D. Acute Toxicity:

Eye Contact: IrritationSkin Contact: DermatitisInhalation: Nose, throat irritant

E. Chronic Toxicity:

Target Organs: Respiratory system, eyes, skin, CNSLong-Term Effects: data not available

V. Exposure Limits:

A. OSHA PEL: 75 ppm (TWA)B. ACGIH TLV: 75 ppm (TWA)C. IDLH: 2000 ppm

D. NIOSH REL: \_\_\_\_\_

E. STEL: 110 ppm

VI. Other Pertinent Information/Special Precautions:



Date: 2/8/91  
#: 36

CHEMICAL DATA SHEET

- I. Chemical/Compound Name: Zinc Oxide (dust)  
A. Synonyms: calamine, amalox, chinese white, emonay  
zinc oxide, Hubbuck's white, zincite  
B. CAS #: 1314-13-2
- II. Physical Characteristics  
A.      Liquid      Solid   X   Powder      Gas  
B. Color - white to yellowish-white  
C. Odor- none  
D. LEL      Flash Pt.      °F  
E. Boiling Point      °F Melting Point >3272 °F  
Ionization Potential      eV  
F. Other- not combustible
- III. Recommended Air Purifying Cartridge:  
  X   Dusts, Fumes, Mists      Acid Gases  
     Organic Vapors      Pesticides  
  X   HEPA      Air Purifying is  
     Ammonia/Amines      Inappropriate  
     Other
- IV. Health Hazards Data  
A. Routes of Entry:   X   Inhalation      Skin Absorption  
     Ingestion  
B. OSHA Listed Carcinogen:   X   No      Suspect      Yes  
C. Sensitizer:      No      No Data      Suspect      Yes  
D. Acute Toxicity:  
Eye Contact       
      
Skin Contact dust can cause irritation leading to rash  
      
Inhalation flu-like symptoms (metal fume fever)-headache,  
fever, chills, muscle ache, nausea, vomiting,  
weakness, fatigue, dyspnea, irritation of throat,  
bronchitis or pneumonia, excess thirst, bluish  
tint to skin  
E. Chronic Toxicity:  
Target Organs respiratory system  
Long-Term Effects low back pain, occasional blurred vision,  
rales, dyspnea, reduction in PVC,  
leukocytosis
- V. Exposure Limits  
A. OSHA PEL: 10 mg/m<sup>3</sup> (as dust containing no asbestos + <190  
crystalline silica) TWA  
B. ACGIH TLV: 5 mg/m<sup>3</sup> (fume)  
C. IDLH       
D. NIOSH REL: 5 mg/m<sup>3</sup> (10 hr. day/40 hr. week TWA) - Fume  
(15 min. ceil)  
E. STEL: 15 mg/m<sup>3</sup>
- VI. Other Pertinent Information/Special Precautions: Exposure to  
high levels can cause metallic or sweet taste in mouth, dryness  
and irritation of throat and coughing at time of exposure.

Date: 8/90  
#: 49

CHEMICAL DATA SHEET

- I. Chemical/Compound Name: Nickel Metal  
A. Synonyms: Kaney Nickel  
B. CAS # 7440-02-0
- II. Physical Characteristics  
A.      Liquid   X   Solid      Powder      Gas  
B. Color: silvery-white, metallic  
C. Odor- odorless  
D. LEL      % Flash pt.      °F  
E. Boiling Point      °F Melting Point      °F  
Ionization Potential       
F. Other
- III. Recommended Air Purifying Cartridge:  
  X   Dusts, Fumes, Mists      Acid Gases  
     Organic Vapors      Pesticides  
  X   HEPA      Air Purifying is  
Inappropriate  
     Ammonia/Amines      Other;
- IV. Health Hazards Data  
A. Routes of Entry:   X   Inhalation      Skin Absorption  
  X   Ingestion  
B. OSHA Listed Carcinogen:   X   No      Suspect      Yes  
C. Sensitizer:      No      No Data      Suspect   X   Yes  
D. Acute Toxicity:  
Eye Contact: may cause irritation and damages to cornea  
Skin Contact: itching, burning and sores (nickel itch)  
Inhalation: lung irritation, coughing, wheezing, shortness  
of breath.  
E. Chronic Toxicity:  
Target Organs: nasal cavities, lungs, skin  
Long-Term Effects: impairment of sense of smell, chest pain,  
destruction of nasal tissues, asthmatic lung disease  
increased risk of lung and nasal cancer
- V. Exposure Limits  
A. OSHA PEL: 1 mg/m<sup>3</sup> (TWA)  
B. ACGIH TLV: 1 mg/m<sup>3</sup> (TWA)  
C. IDLH       
D. NIOSH REL 0.015 mg/m<sup>3</sup> (10-hr. TWA)  
E. STEL
- VI. Other Pertinent Information/Special Precautions: Proposed  
changes (1989-90/ACGIH) to 0.5 mg/m<sup>3</sup>/confirmed human carcinogen.

CHM 001 0529

Date: 2/7/90

#: 13

CHEMICAL DATA SHEET

I. Chemical/Compound Name: Arsenic & Compounds

A. Synonyms: Arsenic solid, colloidal arsenic, metallic arsenic, arsenic black

B. CAS #: 7740-38-2

C. Formula: As Mol. Weight: Vary

II. Physical Characteristics:

A.      Liquid   X   Solid      Powder      Gas

B. Color: vary with specific compound

C. Odor:     

D. LEL:      % Flash Pt.:      °F

E. Boiling Point:      °F Melting Point:      °F

Ionization Potential:     

F. Other: Physical characteristics vary with compound.

III. Recommended Air Purifying Cartridge:

  X   Dusts, Fumes, Mists

     Organic Vapors

  X   HEPA

     Ammonia/Amines

     Acid Gases

     Pesticides

     Air Purifying is

Inappropriate

  X   Other SCBA-at any detectable concentration (NIOSH)

IV. Health Hazards Data:

A. Routes of Entry:   X   Inhalation   X   Skin Absorption  
  X   Ingestion

B. OSHA Listed Carcinogen:      No      Suspect   X   Yes

C. Sensitizer:      No   X   No Data      Suspect   X   Yes

D. Acute Toxicity:

Eye Contact-Conjunctivitis, optic nerve damage & blindness

Skin Contact-Dermatitis, itching, pigmentation/malignant

changes as a result of prolonged exposure,

brittle nails & white lines on nails.

Inhalation-Coughing, chest pains, difficulty breathing, low grade fever, giddiness, headaches, extreme general weakness, nausea, vomiting, diarrhea, breakdown of nasal tissues.

Ingestion-Symptoms develop 1/2-4 hrs. characterized by throat constriction, irritation of stomach and intestines (nausea vomiting, diarrhea) and vascular damage leading to shock, coma, and death.

E. Chronic Toxicity:

Target Organs-Liver, kidneys, skin, lungs, lymphatics

Long-Term Effects-Perforated nasal septum, cirrhosis of liver, disturbances of blood, kidney, CNS, impairment of peripheral circulation resulting in paralysis of fingers and toes, anorexia, stomatitis, salivation, depression of bone marrow, skin and lung cancer.

Arsenic and Compounds

## V. Exposure Limits:

- A. OSHA PEL: 0.01 mg/m<sup>3</sup> TWA  
B. ACGIH TLV: 0.2 mg/m<sup>3</sup> TWA (5 min. ceil)  
C. IDLH: \_\_\_\_\_  
D. NIOSH REL: 0.002 mg/m<sup>3</sup> TWA  
E. STEL: \_\_\_\_\_

VI. Other Pertinent Information/Special Precautions: Toxicities, especially acute are related to their solubility in water. Therefore, soluble arsenic acids and their salts are a greater acute toxic hazard than relatively insoluble arsenic trioxide and lead arsenate.

Date: 2/14/89

Update: 10/15/91

#: 12

CHEMICAL DATA SHEET

- I. Chemical/Compound Name: Benzene  
A. Synonyms: Benzol, cyclohexatriene, coal tar naphtha, phenyl hydride  
B. CAS #: 71-43-2  
C. Formula: C6H6 Mol. Weight: 78

- II. Physical Characteristics:  
A.  Liquid  Solid  Powder  Gas  
B. Color: Colorless  
C. Odor: Aromatic  
D. LEL: 1.3% Flash Pt.: 12 °F  
E. Boiling Point: 176 °F Melting Point: 42 °F  
Ionization Potential: 9.25 eV  
F. Other: Detection Level - 5 ppm

- III. Recommended Air Purifying Cartridge:  
 Dusts, Fumes, Mists  Acid Gases  
 Organic Vapors  Pesticides  
 HEPA  Air Purifying is Inappropriate  
 Ammonia/Amines  Other SCBA at any detectable concentration (NIOSH)

- IV. Health Hazards Data:  
A. Routes of Entry:  Inhalation  Skin Absorption  
 Ingestion  
B. OSHA Listed Carcinogen:  No  Suspect  Yes  
C. Sensitizer:  No  No Data  Suspect  Yes  
D. Acute Toxicity:  
Eye Contact-Irritant  
Skin Contact-Dermatitis, erythema, secondary skin infection  
Inhalation-Giddiness, headache, staggered gait, fatigue lassitude, nose/respiratory irritant (tightness of chest), abdominal pain  
E. Chronic Toxicity:  
Target Organs-Blood, CNS, skin, bone marrow, eyes, respiratory system  
Long-Term Effects-Bone marrow depression, anorexia, aplastic anemia, leukemia

- V. Exposure Limits:  
A. OSHA PEL: 1 ppm (TWA); Action level 0.5 ppm  
B. ACGIH TLV: 0.1 ppm (TWA)  
C. IDLH: \_\_\_\_\_  
D. NIOSH REL: 0.1 ppm TWA (15 min ceil)  
E. STEL: 5 ppm TWA

VI. Other Pertinent Information/Special Precautions: \_\_\_\_\_

Date: 8/90  
#: 83

CHEMICAL DATA SHEET

I. Chemical/Compound Name: Carbon Tetrachloride (Skin)  
A. Synonyms: Tetrachloromethane, perchloromethane  
B. CAS # 56-23-5

II. Physical Characteristics

A.  Liquid  Solid  Powder  Gas  
B. Color: Clear  
C. Odor- Sweet  
D. LEL NA % Flash Pt. NA °F  
E. Boiling Point 170 °F Melting Point -9 °F  
Ionization Potential 11.20 eV  
F. Other: Vapor pressure 91 mm Hg; insoluble in water

III. Recommended Air Purifying Cartridge:

<input type="checkbox"/> Dusts, Fumes, Mists	<input type="checkbox"/> Acid Gases
<input checked="" type="checkbox"/> Organic Vapors	<input type="checkbox"/> Pesticides
<input type="checkbox"/> HEPA	<input type="checkbox"/> Air Purifying is Inappropriate
<input type="checkbox"/> Ammonia/Amines	<input type="checkbox"/> Other _____

IV. Health Hazards Data

A. Routes of Entry:  Inhalation  Skin Absorption  
 Ingestion  
B. OSHA Listed Carcinogen:  No  Suspect  Yes  
C. Sensitizer:  No  No Data  Suspect  Yes  
D. Acute Toxicity:  
Eye Contact: blind spots, and visual haze  
Skin Contact: dermatitis following long and repeated contact; defatting action on skin  
Inhalation: headaches, dizziness, nausea  
E. Chronic toxicity:  
Target Organs: skin, CNS, lungs, liver, kidneys  
Long-Term Effects: dermatitis through defatting action on skin. Has shown to be carcinogenic.

V. Exposure Limits

A. OSHA PEL: 2 ppm; 12.6 mg/m<sup>3</sup>  
B. ACGIH TLV: 5 ppm; 31 mg/m<sup>3</sup> skin  
C. IDLH carcinogen  
D. NIOSH REL 2 ppm 60 min. ceil.  
E. STEL None

VI. Other Pertinent Information/Special Precautions: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

CHEMICAL DATA SHEET

- I. Chemical/Compound Name: Chlorobenzene  
A. Synonyms: Phenyl Chloride, MCB, Monochlorobenzene,  
Chlorobenzol, benzene chloride  
B. CAS #: 108-90-7  
C. Formula: \_\_\_\_\_

- II. Physical Characteristics:  
A.  Liquid \_\_\_\_\_ Solid \_\_\_\_\_ Powder \_\_\_\_\_ Gas  
B. Color: Colorless  
C. Odor: sweet, almond-like  
D. LEL: 1.3% Flash pt.: 84 °F  
E. Boiling Point: 270 °F Melting Point: -47 °F  
Ionization Potential: 9.07 eV  
F. Other: Detection Level - 60 ppm

- III. Recommended Air Purifying Cartridge:  
\_\_\_\_\_ Dusts, Fumes, Mists \_\_\_\_\_ Acid Gases  
 Organic Vapors \_\_\_\_\_ Pesticides  
\_\_\_\_\_ HEPA \_\_\_\_\_ Air Purifying is  
Inappropriate  
\_\_\_\_\_ Ammonia/Amines \_\_\_\_\_ Other: \_\_\_\_\_

- IV. Health Hazards Data:  
A. Routes of Entry:  Inhalation \_\_\_\_\_ Skin Absorption  
\_\_\_\_\_ Ingestion  
B. OSHA Listed Carcinogen:  No \_\_\_\_\_ Suspect \_\_\_\_\_ Yes  
C. Sensitizer: \_\_\_\_\_ No \_\_\_\_\_ No Data \_\_\_\_\_ Suspect \_\_\_\_\_ Yes  
D. Acute Toxicity:  
Eye Contact-Irritation Contact may result in pain and  
transient conjunctival clearing up in 48 hrs.  
Skin Contact-Local irritation.  
Inhalation- Coughing, headache, dizziness, twitching of  
extremities, loss of consciousness,  
incoordination, coma, death.  
E. Chronic Toxicity:  
Target Organs-Respiratory System, skin, CNS, liver, kidneys.  
Long-Term Effects-Prolonged skin contact, can cause burns and  
inflammation. Animal studies only suggest  
further damage.

- V. Exposure Limits:  
A. OSHA PEL: 75 ppm (TWA)  
B. ACGIH TLV: 10 ppm (TWA)  
C. IDLH: 2400 ppm  
D. NIOSH REL: \_\_\_\_\_  
E. STEL: \_\_\_\_\_

- VI. Other Pertinent Information/Special Precautions: \_\_\_\_\_

Date: 8/90  
#: 75

CHEMICAL DATA SHEET

- I. Chemical/Compound Name: Chloroform  
A. Synonyms: Trichloromethane, methyl trichloride,  
trichloroform methane  
B. CAS # 67-66-3

- II. Physical Characteristics  
A.  Liquid  Solid  Powder  Gas  
B. Color: Colorless  
C. Odor- Sweet, ethereal  
D. LEL    % Flash Pt. None °F  
E. Boiling Point 142 °F Melting Point -82 °F  
Ionization Potential 11.42 eV  
F. Other

- III. Recommended Air Purifying Cartridge:  
 Dusts, Fumes, Mists  Acid Gases  
 Organic Vapors  Pesticides  
 HEPA  Air Purifying is  
Inappropriate  
 Ammonia/Amines  Other:

- IV. Health Hazards Data  
A. Routes of Entry:  Inhalation  Skin Absorption  
 Ingestion  
B. OSHA Listed Carcinogen:  No  Suspect  Yes  
C. Sensitizer:  No  No Data  Suspect  Yes  
D. Acute Toxicity:  
Eye Contact irritation, vapors can cause stinging sensation,  
splashes-tissue damage  
Skin Contact: redding, blistering, chemical burns on  
prolonged contact  
Inhalation: dizziness, mental dullness, nausea, headaches,  
fatigue, dilation of pupils  
E. Chronic toxicity:  
Target Organs: liver, kidneys, heart, eyes, skin, CNS  
Long-Term Effects: depression, hallucinations, loss of  
appetite, sluggishness, kidney/liver/heart  
damage.

- V. Exposure Limits  
A. OSHA PEL: 2 ppm (TWA)  
B. ACGIH TLV: 10 ppm (TWA)  
C. IDLH     
D. NIOSH REL 2 ppm (TWA) (60 min. ceil.)  
E. STEL

- VI. Other Pertinent Information/Special Precautions: Minimum  
detectable odor: 200 ppm



Date: 8/90  
#: 77

CHEMICAL DATA SHEET

- I. Chemical/Compound Name: 1,2-dichlorobenzene (skin)  
A. Synonyms: o-dichlorobenzene, ortho-dichlorobenzol,  
ortho-dichlorobenzene  
B. CAS # 95-50-1

- II. Physical Characteristics  
A.  Liquid  Solid  Powder  Gas  
B. Color: Colorless-pale yellow  
C. Odor- Aromatic  
D. LEL 2.2% Flash Pt. 151 °F  
E. Boiling Point 356 °F Melting Point 0.5 °F  
Ionization Potential 9.06 eV  
F. Other \_\_\_\_\_

- III. Recommended Air Purifying Cartridge:  
 Dusts, Fumes, Mists  Acid Gases  
 Organic Vapors  Pesticides  
 HEPA  Air Purifying is  
Inappropriate  
 Ammonia/Amines  Other Chemical Cartridge  
respirator

- IV. Health Hazards Data  
A. Routes of Entry:  Inhalation  Skin Absorption  
 Ingestion  
B. OSHA Listed Carcinogen:  No  Suspect  Yes  
C. Sensitizer:  No  No Data  Suspect  Yes  
D. Acute Toxicity:  
Eye Contact: Irritation, cataracts  
Skin Contact: irritation, reddening, swelling and sores  
in sensitive individuals  
Inhalation: Nasal irritation, headache, nausea, vomiting  
drowsiness, incoordination, unconsciousness,  
death.  
E. Chronic toxicity:  
Target Organs: Liver, kidneys, skin, eyes  
Long-Term Effects: Liver, kidney and lung damage, skin  
burns, blood changes

- V. Exposure Limits  
A. OSHA PEL: 50 ppm (ceil) (TWA)  
B. ACGIH TLV: 50 ppm (ceil) (TWA)  
C. IDLH 1700 ppm  
D. NIOSH REL \_\_\_\_\_  
E. STEL \_\_\_\_\_

- VI. Other Pertinent Information/Special Precautions: Minimum  
detectable by odor 50 ppm.

Date: 1/17/89  
Update: 10/15/91  
#: 7

CHEMICAL DATA SHEET

- I. Chemical/Compound Name: 1,2-Dichloroethane  
A. Synonyms: Ethylene dichloride, glycol dichloride,  
Dutch Oil  
B. CAS #: 107-06-02
- II. Physical Characteristics  
A.  Liquid  Solid  Powder  Gas  
B. Color - Clear/Colorless  
C. Odor - sweetish (as chloroform)  
D. LEL 6.2% Flash Pt. 55 °F  
E. Boiling Point 183 °F Melting Point 32 °F  
Ionization Potential 9.64 eV  
F. Other: Detection Level - 6 ppm
- III. Recommended Gas Mask Canister:  
 Dusts, Fumes, Mists  Acid Gases  
 Organic Vapors (for escape)  Pesticides  
 HEPA  Air Purifying is  
Inappropriate  
 Ammonia/Amines  Other-levels up to 250ppm  
- SCBA with full face-  
piece, helmet or hood.
- IV. Health Hazards Data  
A. Routes of Entry:  Inhalation  Skin Absorption  
 Ingestion  
B. OSHA Listed Carcinogen:  No  Suspect  Yes  
C. Sensitizer:  No  No Data  Suspect  Yes  
D. Acute Toxicity:  
Eye Contact -corneal opacity; redness, pain, blurred vision  
\_\_\_\_\_  
Skin Contact -dermatitis  
\_\_\_\_\_  
Inhalation -pulmonary edema, nose/throat irritation,  
vomiting, cyanosis, rapid pulse, loss of  
consciousness  
E. Chronic Toxicity:  
Target Organs -kidneys, liver, eyes, skin, CNS  
Long-Term Effects -loss of appetite, CNS depression,  
vomiting, low blood sugar levels, leucocytosis, tremors  
coma/death.
- V. Exposure Limits  
A. OSHA PEL -50 ppm (TWA) 100 ppm ceiling;  
200 ppm 5-min/3 hr peak  
B. ACGIH TLV -10 ppm (TWA)  
C. IDLH \_\_\_\_\_  
D. NIOSH REL -1ppm (10-hour TWA); 2 ppm (15 min. ceiling)  
E. STEL \_\_\_\_\_
- VI. Other Pertinent Information/Special Precautions: Identified by  
NIOSH as an occupational carcinogen. Classification outlined in  
29CFR1990.103.

Date: 8/90  
Update: 10/15/91  
#: 14

CHEMICAL DATA SHEET

- I. Chemical/Compound Name: 1,1-dichloroethylene(1,1-dichloroethene)  
A. Synonyms: Vinylidene Chloride. 1,1-DCE, VOC  
B. CAS #: 75-35-4
- II. Physical Characteristics:  
A.  Liquid  Solid  Powder  Gas  
B. Color: Colorless  
C. Odor: Sweet mild; Chloroform-like  
D. LEL: 7.3 % Flash Pt.: -187.6 °F  
E. Boiling Point: 89 °F Melting Point:       ° F  
Ionization Potential: \_\_\_\_\_  
F. Other: \_\_\_\_\_
- III. Recommended Air Purifying Cartridge:  
 Dusts, Fumes, Mists  Acid Gases  
 Organic Vapors  Pesticides  
 HEPA  Air Purifying is  
Inappropriate  
 Ammonia/Amines  Other \_\_\_\_\_
- IV. Health Hazards Data:  
A. Routes of Entry:  Inhalation  Skin Absorption  
 Ingestion  
B. OSHA Listed Carcinogen:  No  Suspect  Yes  
C. Sensitizer:  No  No Data  Suspect  Yes  
D. Acute Toxicity:  
Eye Contact-Moderately irritating causing pain, conjunctival irritation, and some transient corneal injury.  
Skin Contact-Irritant. May cause burns. Chemical volatility probably prevents significant skin absorption.  
Inhalation-At high concentrations 4000 ppm induce promptly symptoms of CNS depression associated with drunkenness which may progress to unconsciousness.  
E. Chronic Toxicity:  
Target Organs-Kidney and liver (possible).  
Long-Term Effects-No conclusive data.
- V. Exposure Limits:  
A. OSHA PEL: 1 ppm (TWA)  
B. ACGIH TLV: 5 ppm (TWA)  
C. IDLH: \_\_\_\_\_  
D. NIOSH REL: 1 ppm TWA  
E. STEL: 20 ppm (TWA)
- VI. Other Pertinent Information/Special Precautions: \_\_\_\_\_

CHM 001 0538

Date: 3/90

#: 70

CHEMICAL DATA SHEET

I. Chemical/Compound Name: Ethyl benzene  
A. Synonyms: Phenylethane, ethylbenzol  
B. CAS # 100-41-4

II. Physical Characteristics  
A.  Liquid  Solid  Powder  Gas  
B. Color: Colorless  
C. Odor: Aromatic, gasoline-like  
D. LEL 1.0% Flash Pt. 59 °F  
E. Boiling Point 277 °F Melting Point 139 °F  
Ionization Potential 8.76 eV  
F. Other \_\_\_\_\_

III. Recommended Air Purifying Cartridge:  
 Dusts, Fumes, Mists  Acid Gases  
 Organic Vapors  Pesticides  
 HEPA  Air Purifying is  
Inappropriate  
 Ammonia/Amines  Other \_\_\_\_\_

IV. Health Hazards Data  
A. Routes of Entry:  Inhalation  Skin Absorption  
 Ingestion  
B. OSHA Listed Carcinogen:  No  Suspect  Yes  
C. Sensitizer:  No  No Data  Suspect  Yes  
D. Acute Toxicity:  
Eye Contact: Irritant at 200 ppm, higher levels, can  
produce burning, tearing, injury  
Skin Contact: Inflammation, blisters, burns  
Inhalation: Headaches, dizziness, sense of constriction  
of chest, nose and throat irritant, vertigo,  
unconsciousness at very high levels (>200 ppm)  
E. Chronic toxicity:  
Target Organs: Eyes, upper respiratory system, skin, CNS  
Long-Term Effects: skin rash; eye, nose, throat irritation

V. Exposure Limits  
A. OSHA PEL: 100 ppm (TWA)  
B. ACGIH TLV: 100 ppm (TWA)  
C. IDLH 2000 ppm TWA  
D. NIOSH REL none established  
E. STEL 125 ppm

VI. Other Pertinent Information/Special Precautions: The TLV  
established to prevent eye irritation (1977)

CHM 001 0539

Date: 8/90  
#: 68

CHEMICAL DATA SHEET

- I. Chemical/Compound Name: Methylene Chloride  
A. Synonyms: Dichloromethane, Methylene Dichloride  
B. CAS # 75-09-2
- II. Physical Characteristics  
A.  Liquid  Solid  Powder  Gas  
B. Color: Colorless  
C. Odor- Sweetish (as chloroform)  
D. LEL 12 % Flash Pt. -96.7 °F  
E. Boiling Point 104 °F Melting Point 142 °F  
Ionization Potential 11.35 eV  
F. Other \_\_\_\_\_
- III. Recommended Air Purifying Cartridge:  
 Dusts, Fumes, Mists  Acid Gases  
 Organic Vapors  Pesticides  
 HEPA  Air Purifying is  
Inappropriate  
 Ammonia/Amines  Other: \_\_\_\_\_
- IV. Health Hazards Data  
A. Routes of Entry:  Inhalation  Skin Absorption  
 Ingestion  
B. OSHA Listed Carcinogen:  No  Suspect  Yes  
C. Sensitizer:  No  No Data  Suspect  Yes  
D. Acute Toxicity:  
Eye Contact: Pain, irritation, burns  
Skin Contact: Chemical burn with prolonged contact  
Inhalation: Fatigue, weakness, lightheaded, numbness/  
tingling of limbs, nausea, blurred vision  
staggered gait  
E. Chronic toxicity:  
Target Organs: Skin, CVS, eyes, CNS  
Long-Term Effects: Vertigo, angina complications, narcosis  
bone marrow depression, difficulty in speech  
decreased response to visual and auditory  
stimulation, liver damage
- V. Exposure Limits  
A. OSHA PEL: 500 ppm (TWA), 1000 ppm (ceiling); 2000 ppm 5 min in  
any 2 hrs.  
B. ACGIH TLV: 50 ppm (TWA)  
C. IDLH \_\_\_\_\_  
D. NIOSH REL \_\_\_\_\_  
E. STEL \_\_\_\_\_
- VI. Other Pertinent Information/Special Precautions: Changes to  
Carbon Monoxide in body/especially dangerous for persons with  
heart problems. Minimum detectable by odor: 214 ppm.

Date: 10/90  
Update: 10/15/91  
#: 11

CHEMICAL DATA SHEET

- I. Chemical/Compound Name: Tetrachloroethylene (Tetrachloroethene)  
A. Synonyms: Perchloroethylene, Perk  
B. CAS #: 127-18-4  
C. Formula: CCl<sub>2</sub>=CCl<sub>2</sub> Mol. weight: 165.85
- II. Physical Characteristics:  
A.  Liquid  Solid  Powder  Gas  
B. Color: Colorless  
C. Odor: Ether, Chloroform-like  
D. LEL Not Combustible % Flash Pt.          °F  
E. Boiling Point 250 °F Melting Point -8 °F  
Ionization Potential 9.32 eV  
F. Other: Detection Level - 5 ppm
- III. Recommended Air Purifying Cartridge:  
         Dusts, Fumes, Mists          Acid Gases  
 Organic Vapors          Pesticides  
         HEPA          Air Purifying is  
         Ammonia/Amines          Inappropriate  
         Other:
- IV. Health Hazards Data:  
A. Routes of Entry:  Inhalation          Skin Absorption  
 Ingestion  
B. OSHA Listed Carcinogen:          No  Suspect          Yes  
C. Sensitizer:          No  No Data          Suspect          Yes  
D. Acute Toxicity:  
Eye Contact-Irritant. May cause lacrimation and burning.  
Skin Contact-Mild skin irritation. If exposures are confined or prolonged, may cause dermatitis.  
Inhalation-Nose, throat, upper respiratory irritant. May produce headaches, nausea and vomiting, giddiness, inebriation, sinus inflammation salivation, a metallic taste and narcosis. Massive exposure may cause death by respiratory arrest.  
E. Chronic Toxicity:  
Target Organs-Liver, kidneys, eyes, upper resp. tract, CNS  
Long-Term Effects-Liver and kidney damage. Possibly lung and cervical cancer.
- V. Exposure Limits:  
A. OSHA PEL: 100 ppm TWA, 200 ppm Ceil, 300 ppm/5 min 3 hr peak  
B. ACGIH TLV: 50 ppm TWA  
C. IDLH:           
D. NIOSH REL: lowest feasible limit  
E. STEL: 200 ppm TWA
- VI. Other Pertinent Information/Special Precautions:

CHM 001 0541

Date: 3/90  
Updated: 11/8/91  
#: 66

CHEMICAL DATA SHEET

- I. Chemical/Compound Name: Vinyl Chloride  
A. Synonyms: Chloroethene, chloroethylene, VC, vinyl chloride monomer  
B. CAS # 75-01-4
- II. Physical Characteristics  
A.  Liquid  Solid  Powder  Gas  
B. Color: Colorless  
C. Odor: Ether-like, faint sweet odor  
D. LEL 3.5% Flash pt. -108 °F  
E. Boiling Point 7 °F Melting Point -245 °F  
Ionization Potential 9.995  
F. Other \_\_\_\_\_
- III. Recommended Air Purifying Cartridge:  
 Dusts, Fumes, Mists  Acid Gases  
 Organic Vapors  Pesticides  
 HEPA  Air Purifying is  
Inappropriate  
 Ammonia/Amines  Other: Any chemical cartridge respirator with an organic vapor cartridge providing a service life of at least 1 hour concentration up to 10ppm. (29 CFR 1910.1017(g)(4))
- IV. Health Hazards Data  
A. Routes of Entry:  Inhalation  Skin Absorption  
 Ingestion  
B. OSHA Listed Carcinogen:  No  Suspect  Yes  
C. Sensitizer:  No  No Data  Suspect  Yes  
D. Acute Toxicity:  
Eye Contact: Severe and immediate irritation  
Skin Contact: Contact with liquified gas can cause frostbite; Contact with vapor may cause irritation & rash  
Inhalation: Dizziness, lightheadedness, nausea in high concentrations; Numbness and tingling of fingers and toes, abdominal pain, coughing, sneezing, irritability, loss of appetite and weight  
E. Chronic toxicity:  
Target Organs: Liver, CNS, respiratory system, hepatic system  
Long-Term Effects: Angiosarcoma of the liver, CNS depression lesions in the fingers, weakness, abdominal pain, club-like swelling and shortening of fingertips

V. Exposure Limits

A. OSHA PEL: 1 ppm (TWA)

B. ACGIH TLV: 5 ppm (TWA) 1987

C. IDLH

D. NIOSH REL Lowest detectable limit (< 1ppm)

E. STEL 5 ppm

VI. Other Pertinent Information/Special Precautions: "No employee may be exposed to vinyl chloride by direct contact with liquid vinyl chloride." (29CFR 1910.1017(c)(3))  
Odor threshold - 260ppm



Date: 3/90  
#: 78

CHEMICAL DATA SHEET

I. Chemical/Compound Name: Xylene (o-, m-, and p-isomers)  
A. Synonyms: 1,2-; 1,3-; and 1,4-dimethyl-benzene  
B. CAS # 1330-20-7

II. Physical Characteristics  
A.  Liquid  Solid  Powder  Gas  
B. Color: Colorless  
C. Odor- Aromatic  
D. LEL 1.1% Flash Pt. 81° F  
E. Boiling Point 281° F Melting Point 55° F  
Ionization Potential 8.44eV  
F. Other \_\_\_\_\_

III. Recommended Air Purifying Cartridge:  
 Dusts, Fumes, Mists  Acid Gases  
 Organic Vapors  Pesticides  
 HEPA  Air Purifying is  
Inappropriate  
 Ammonia/Amines  Other \_\_\_\_\_

IV. Health Hazards Data  
A. Routes of Entry:  Inhalation  Skin Absorption  
 Ingestion  
B. OSHA Listed Carcinogen:  No  Suspect  Yes  
C. Sensitizer:  No  No Data  Suspect  Yes  
D. Acute Toxicity:  
Eye Contact: irritant  
Skin Contact: dryness, defatting  
Inhalation: Irritant of mucous membranes, CNS depressant.  
(shallow breathing/weak pulse), Intoxication  
-like symptoms: dizziness, drowsi-ness  
staggering gait, headache, nausea  
E. Chronic toxicity:  
Target Organs: CNS, eyes, blood, liver, kidneys, skin  
Long-Term Effects: dizziness, headache, nausea, liver and  
kidney damage, GI tract disturbances,  
CNS, depression

V. Exposure Limits  
A. OSHA PEL: 100 ppm TWA  
B. ACGIH TLV: 100 ppm TWA  
C. IDLH 1,000 ppm  
D. NIOSH REL 100 ppm (10-hr TWA) 200 ppm 10-min ceiling  
E. STEL 150 ppm

VI. Other Pertinent Information/Special Precautions: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

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Date: 3/90  
#: 79

CHEMICAL DATA SHEET

I. Chemical/Compound Name: Toluene  
A. Synonyms: Toluol, methyl benzene, phenyl methane  
B. CAS # 108-88-3

II. Physical Characteristics  
A.  Liquid  Solid  Powder  Gas  
B. Color: Colorless  
C. Odor- Benzene-like  
D. LEL 1.3% Flash Pt. 40 °F  
E. Boiling Point 231 °F Melting Point -139 °F  
Ionization Potential 8.82  
F. Other \_\_\_\_\_

III. Recommended Air Purifying Cartridge:  
 Dusts, Fumes, Mists  Acid Gases  
 Organic Vapors  Pesticides  
 HEPA  Air Purifying is Inappropriate  
 Ammonia/Amines  Other \_\_\_\_\_

IV. Health Hazards Data  
A. Routes of Entry:  Inhalation  Skin Absorption  
 Ingestion  
B. OSHA Listed Carcinogen:  No  Suspect  Yes  
C. Sensitizer:  No  No Data  Suspect  Yes  
D. Acute Toxicity:  
Eye Contact: irritant (at 300 ppm)  
Skin Contact: redness, drying of skin  
Inhalation: headache, nausea, lassitude, intoxication,  
hallucinations, dilated pupils  
E. Chronic toxicity:  
Target Organs: Liver, CNS, skin  
Long-Term Effects: Loss of memory, loss of appetite,  
heart palpitations, loss of coordination

V. Exposure Limits  
A. OSHA PEL: 100 ppm TWA, 300 ppm ceiling, 500 ppm 10-min peak  
B. ACGIH TLV: 100 ppm TWA  
C. IDLH 2000 ppm  
D. NIOSH REL 100 ppm 10-hr TWA; 200 ppm 10-min ceiling  
E. STEL 150 ppm

VI. Other Pertinent Information/Special Precautions: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

## CHEMICAL DATA SHEET

- I. Chemical/Compound Name: Trichloroethylene (Trichloroethene)  
 A. Synonyms: TCE, Ethylene Trichloride, Triclene,  
Acetylene Trichloride  
 B. CAS #: 79-01-6  
 C. Formula: CHCl=CCl<sub>2</sub> Mol. Weight: 131.4
- II. Physical Characteristics:  
 A.  Liquid  Solid  Powder  Gas  
 B. Color: Clear, Colorless  
 C. Odor: Chloroform - like, sweet  
 D. LEL: 11 % Flash Pt.: None °F  
 E. Boiling Point: 188 °F Melting Point -123 °F  
 Ionization Potential: 9.47 eV  
 F. Other: Detection Level - 25 ppm
- III. Recommended Air Purifying Cartridge:  
 Dusts, Fumes, Mists  Acid Gases  
 Organic Vapors  Pesticides  
 HEPA  Air Purifying is  
 Inappropriate  
 Ammonia/Amines  Other \_\_\_\_\_
- IV. Health Hazards Data:  
 A. Routes of Entry:  Inhalation  Skin Absorption  
 Ingestion  
 B. OSHA Listed Carcinogen:  No  Suspect  Yes  
 C. Sensitizer:  No  No Data  Suspect  Yes  
 D. Acute Toxicity:  
 Eye Contact-Eye Irritant.  
 Skin Contact-Mildly irritating. Alcohol intake may potentiate cutaneous vasodilation (redness of the skin). Prolonged use can cause burning and dryness of skin.  
 Inhalation-CNS Depressant, sometimes preceded by headache, nausea, mental confusion, fatigue, incoordination, excitation or euphoria; a mild irritant to respiratory system. Other effects are arrhythmias, liver and kidney lesions, hypertension, coma or death.  
 E. Chronic Toxicity:  
 Target Organs-Liver, kidneys, respiratory system, skin, CNS  
 Long-Term Effects-CNS despression, intolerance to alcohol and increased cardiac output; symptoms abate when TCE is removed. Dermatitis, liver and kidney damage.
- V. Exposure Limits:  
 A. OSHA PEL: 100 ppm, TWA; 200 ppm, Ceiling; 300 ppm, 5 min/2 hr. peak  
 B. ACGIH TLV: 50 ppm, (TWA)  
 C. IDLH: \_\_\_\_\_  
 D. NIOSH REL: 25 ppm (10-hr TWA)  
 E. STEL: 200 ppm
- VI. Other Pertinent Information/Special Precautions: NIOSH listed potential carcinogen. Odor threshold determined as low as 22 ppm.

Date: 10/88  
Update: 10/15/91  
#: 3

CHEMICAL DATA SHEET

I. Chemical/Compound Name: Trans - 1,2-Dichloroethylene  
A. Synonyms: Acetylene Dichloride, 1,2-dichloroethene  
B. CAS #: 540-59-0

II. Physical Characteristics

A.  Liquid  Solid  Powder  Gas  
B. Color: Clear  
C. Odor: Ether-like  
D. LEL 9.7 % Flash Pt. 36-39°F  
E. Boiling Point 113-140°F Melting Point -56 - -115°F  
Ionization Potential 9.65 eV  
F. Other-Detection Level - 0.085 ppm

III. Recommended Air Purifying Cartridge:

<input type="checkbox"/> Dusts, Fumes, Mists	<input type="checkbox"/> Acid Gases
<input checked="" type="checkbox"/> Organic Vapors	<input type="checkbox"/> Pesticides
<input type="checkbox"/> HEPA	<input type="checkbox"/> Air Purifying is Inappropriate
<input type="checkbox"/> Ammonia/Amines	<input type="checkbox"/> Other _____

IV. Health Hazards Data

A. Routes of Entry:  Inhalation  Skin Absorption  
 Ingestion

B. OSHA Listed Carcinogen:  No  Suspect  Yes

C. Sensitizer:  No  No Data  Suspect  Yes

D. Acute Toxicity:  
Eye Contact May cause irritation and/or reversible corneal clouding.  
Skin Contact May cause irritation and redness of skin.  
Inhalation May cause irritation to the respiratory system and CNS depression. In milder exposures may cause nausea, vomiting, weakness tremors and epigastric cramps, vertigo, unconsciousness at high level. Recovery usually rapid.

E. Chronic Toxicity:  
Target Organs Respiratory system, eyes, Central Nervous System  
Long-Term Effects Dermatitis

V. Exposure Limits

A. OSHA PEL 200 ppm  
B. ACGIH TLV 200 ppm  
C. IDLH 4000 ppm  
D. NIOSH REL None  
E. STEL None

VI. Other Pertinent Information/Special Precautions: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Date: 8/90  
#: 67

CHEMICAL DATA SHEET

- I. Chemical/Compound Name: Phenol (Skin)  
A. Synonyms: Carbolic acid, Monohydroxy benzene, phenylic alcohol, hydroxybenzene, phenyl hydroxide  
B. CAS # 108-95-2
- II. Physical Characteristics  
A.  Liquid  Solid  Powder  Gas  
B. Color: Colorless to pink  
C. Odor: Sweet tarry  
D. LEL 1.7% Flash pt. 174 °F  
E. Boiling Point 359 °F Melting Point 106 °F  
Ionization Potential 8.5  
F. Other \_\_\_\_\_
- III. Recommended Air Purifying Cartridge:  
 Dusts, Fumes, Mists  Acid Gases  
 Organic Vapors  Pesticides  
 HEPA  Air Purifying is Inappropriate  
 Ammonia/Amines  Other: Chemical cartridge respirator
- IV. Health Hazards Data  
A. Routes of Entry:  Inhalation  Skin Absorption  
 Ingestion  
B. OSHA Listed Carcinogen:  No  Suspect  Yes  
C. Sensitizer:  No  No Data  Suspect  Yes  
D. Acute Toxicity:  
Eye Contact: Irritant, swelling & severe damage that can lead to blindness.  
Skin Contact: White patches & wrinkles; intense pain if not removed promptly, a local anesthetic, gangrene can follow.  
Inhalation: Irritation of nose & throat, nausea, vomiting, abdominal pain and poisoning.\*  
E. Chronic toxicity:  
Target Organs: Liver, kidneys, skin  
Long-Term Effects: skin absorption can cause severe poisoning and death, irregular breathing, blue coloration of skin, shock, unconsciousness, dark urine, mental disturbances, liver and kidney damage.
- V. Exposure Limits  
A. OSHA PEL: 5 ppm TWA  
B. ACGIH TLV: 5 ppm TWA  
C. IDLH 250 ppm  
D. NIOSH REL 5 ppm (10-hr. TWA)  
E. STEL \_\_\_\_\_
- VI. Other Pertinent Information/Special Precautions: A common air contaminant. Minimum detectable by odor 0.05 ppm.

\*no reported deaths from inhalation alone.

Date: 8/90  
#: 33

CHEMICAL DATA SHEET

- I. Chemical/Compound Name: Aroclor 1254 (54% Chlorine) (Skin)  
A. Synonyms: Polychlorinated biphenyl, chlorodiphenyl, PCBs  
B. CAS #: 11097-69-1
- II. Physical Characteristics:  
A.  Liquid  Solid  Powder  Gas  
B. Color-colorless (liquid) with light-dark yellow (resin /wax) or white to yellow (powder)  
C. Odor-aromatic acrid  
D. LEL    % Flash Pt. 432 °F  
E. Boiling Point 689-734 °F Melting Point 50 °F  
Ionization Potential     
F. Other
- III. Recommended Air Purifying Cartridge:  
 Dusts, Fumes, Mists  Acid Gases  
 Organic Vapors  Pesticides  
 HEPA  Air Purifying is Inappropriate  
 Ammonia/Amines  Other SCBA
- IV. Health Hazards Data:  
A. Routes of Entry:  Inhalation  Skin Absorption  
 Ingestion (Moderate)  
B. OSHA Listed Carcinogen:  No  Suspect  Yes  
C. Sensitizer:  No  No Data  Suspect  Yes  
D. Acute Toxicity:  
Eye Contact- irritation, discharge, swelling of eyelids  
Skin Contact- an irritant, acne-like rash, pustules  
Inhalation- irritation to nose, throat & lungs, nausea, vomiting, anorexia, jaundice, edema, abdominal pain, fatigue, dark urine  
E. Chronic Toxicity:  
Target Organs- liver, eyes, skin  
Long-Term Effects- suspect carcinogen, chloracne, pigmentation (skin, nails)
- V. Exposure Limits:  
A. OSHA PEL: 0.5 mg/m<sup>3</sup> (TWA)  
B. ACGIH TLV: 0.5 mg/m<sup>3</sup> (TWA)  
C. IDLH:     
D. NIOSH REL: 0.001 mg/m<sup>3</sup> (10-hr. TWA)  
E. STEL:
- VI. Other Pertinent Information/Special Precautions:  
Can persist in tissues for years after exposure stops.  
Aroclor 1248 (48% Chlorine) - exposure limits as for Aroclor 1254  
Aroclor 1242 (42% Chlorine) - OSHA PEL - 1.0 mg/m<sup>3</sup> (TWA)  
ACGIH - 1.0 mg/m<sup>3</sup> (TWA)

Date: 2/8/90  
#: 39

CHEMICAL DATA SHEET

I. Chemical/Compound Name: Lead, inorganic, as dust  
A. Synonyms: Pb, solder, dross  
B. CAS # 7439-92-1

II. Physical Characteristics  
A.      Liquid   X   Solid      Powder      Gas  
B. Color: Silvery to gray, depending upon oxidation  
C. Odor: Varies with compound  
D. LEL Dust may be explosive Flash Pt. NA °F  
E. Boiling Point 3164 °F Melting Point 621 °F  
Ionization Potential NA  
F. Other     

III. Recommended Air Purifying Cartridge:  
  X   Dusts, Fumes, Mists      Acid Gases  
     Organic Vapors      Pesticides  
  X   HEPA      Air Purifying is  
     Ammonia/Amines      Inappropriate  
     Other     

IV. Health Hazards Data  
A. Routes of Entry:   X   Inhalation   X   Skin Absorption  
  X   Ingestion  
B. OSHA Listed Carcinogen:      No   X   Suspect      Yes  
C. Sensitizer:      No   X   No Data      Suspect      Yes  
D. Acute Toxicity:  
Eye Contact: Dust is irritant  
Skin Contact: Molten lead causes burns. Generally, in solid state lead causes no acute symptoms.  
Inhalation: Lassitude, insomnia, weakness, GI disturbances, colic.  
E. Chronic Toxicity:  
Target Organs: CNS, blood, GI tract, kidneys, gingival tissue  
Long-Term Effects: Anorexia, weight loss, constipation, pallor, neuro-muscular motor weakness, "wrist drop", A suspect carcinogen of the lungs and kidneys. An experimental teratogen.

V. Exposure Limits  
A. OSHA PEL: 0.05 mg/m<sup>3</sup> TWA  
B. ACGIH TLV: 0.15 mg/m<sup>3</sup> TWA  
C. IDLH       
D. NIOSH REL <0.1 mg/m<sup>3</sup> 10 hr. TWA  
E. STEL     

VI. Other Pertinent Information/Special Precautions:     

CHM 001 0550

**APPENDIX B**  
**MATERIAL SAFETY DATA SHEETS**

CHM 001 0551



Material Safety Data Sheet  
May be used to comply with  
OSHA's Hazard Communication Standard,  
29 CFR 1910.1200. Standard must be  
consulted for specific requirements.

U.S. Department of Labor  
Occupational Safety and Health Administration  
(Non-Mandatory Form)  
Form Approved  
OMB No. 1218-0072



IDENTITY (As Used on Label and List)

ALCONOX

Note: Blank spaces are not permitted. If any item is not applicable, or no information is available, the space must be marked to indicate that.

Section I

Manufacturer's Name ALCONOX, INC.	Emergency Telephone Number (212) 473-1300
Address (Number, Street, City, State, and ZIP Code) 215 PARK AVENUE SOUTH	Telephone Number for Information (212) 473-1300
NEW YORK, N.Y. 10003	Date Prepared JULY 1, 1989
	Signature of Preparer (optional)

Section II - Hazardous Ingredients/Identify Information

Hazardous Components (Specific Chemical Identity, Common Name(s))	OSHA PEL	ACGIH TLV	Other Limits Recommended	% (optional)
THERE ARE NO INGREDIENTS IN ALCONOX WHICH APPEARED ON THE OSHA STANDARD 29 CFR 1910 SUBPART Z.				

Section III - Physical/Chemical Characteristics

Boiling Point	N.A.	Specific Gravity (H <sub>2</sub> O = 1)	N.A.
Vapor Pressure (mm Hg)	N.A.	Melting Point	N.A.
Vapor Density (AIR = 1)	N.A.	Evaporation Rate (Butyl Acetate = 1)	N.A.

Solubility in Water: APPRECIABLE (GREATER THAN 10 PER CENT)

Appearance and Odor: WHITE POWDER INTERSPERED WITH CREAM COLORED FLAKES - ODORLESS

Section IV - Fire and Explosion Hazard Data

Flash Point (Method Used) NONE	Flammable Limits	LEL N.A.	UEL N.A.
Extinguishing Media WATER, CO <sub>2</sub> , DRY CHEMICAL, FOAM, SAND/EARTH	Special Fire Fighting Procedures FOR FIRES INVOLVING THIS MATERIAL DO NOT ENTER WITHOUT PROTECTIVE EQUIPMENT AND SELF CONTAINED BREATHING APPARATUS.		
Unusual Fire and Explosion Hazards NONE			

Reviewed 10/9/89 E

**Section V — Reactivity Data**

Stability	Unstable	Conditions to Avoid	NONE
	Stable		

Incompatibility (Materials to Avoid) **AVOID STRONG ACIDS**

Hazardous Decomposition or Byproducts **MAY RELEASE CO<sub>2</sub> GAS ON BURNING**

Hazardous Polymerization	May Occur	Conditions to Avoid	NONE
	Will Not Occur		

**Section VI — Health Hazard Data**

Route(s) of Entry	Inhalation?	YES	NO	Skin?	NO	Ingestion?	YES
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Health Hazards (Acute and Chronic) **INHALATION OF POWDER MAY PROVE LOCALLY IRRITATING TO MUCOUS MEMBRANES. INGESTION MAY CAUSE DISCOMFORT AND/OR DIARRHEA.**

Carcinogenicity:	NTP?	NO	IARC Monographs?	NO	OSHA Regulated?	NO
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Signs and Symptoms of Exposure **EXPOSURE MAY IRRITATE MUCOUS MEMBRANES. MAY CAUSE SNEEZING.**

Medical Conditions Generally Aggravated by Exposure **RESPIRATORY CONDITIONS MAY BE AGGRAVATED BY POWDER.**

Emergency and First Aid Procedures  
**EYES-FLUSH WITH PLENTY OF WATER FOR 15 MINUTES. SKIN-FLUSH WITH PLENTY OF WATER. INGESTION-DRINK LARGE QUANTITIES OF WATER. GET MEDICAL ATTENTION FOR DISCOMFORT.**

**Section VII — Precautions for Safe Handling and Use**

Steps to Be Taken in Case Material is Released or Spilled **MATERIAL FOAMS PROFUSELY. SHOVEL AND RECOVER AS MUCH AS POSSIBLE. RINSE REMAINDER TO SEWER. MATERIAL IS COMPLETELY BIODEGRADABLE.**

Waste Disposal Method **SMALL QUANTITIES MAY BE DISPOSED OF IN SEWER. LARGE QUANTITIES SHOULD BE DISPOSED OF ACCORDING TO LOCAL REQUIREMENTS FOR NON-HAZARDOUS DETERGENT.**

Precautions to Be Taken in Handling and Storing **STORE IN A DRY AREA TO PREVENT CAKING.**

Other Precautions **NO SPECIAL REQUIREMENTS OTHER THAN THE GOOD INDUSTRIAL HYGIENE AND SAFETY PRACTICES EMPLOYED WITH ANY INDUSTRIAL CHEMICAL.**

**Section VIII — Control Measures**

Respiratory Protection (Specify Type) **DUST MASK**

Ventilation	Local Exhaust	NORMAL	Special	N.A.
	Mechanical (General)	N.A.	Other	N.A.

Protective Gloves **USEFUL-NOT REQUIRED** Eye Protection **USEFUL-NOT REQUIRED**

Other Protective Clothing or Equipment **NOT REQUIRED**

Work/Hygiene Practices **NO SPECIAL PRACTICES REQUIRED**

CHM 001 0553

+-SULFURIC ACID\*\*  
 \*\*SULFURIC ACID\*\*  
 \*\*SULFURIC ACID\*\*

MATERIAL SAFETY DATA SHEET

FISHER SCIENTIFIC  
 CHEMICAL DIVISION  
 1 REAGENT LANE  
 FAIR LAWN NJ 07410  
 (201) 796-7100

EMERGENCY NUMBER: (201) 796-7100  
 CHEMTREC ASSISTANCE: (800) 424-9300

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SUBSTANCE IDENTIFICATION

CAS NUMBER 7664-93-9

SUBSTANCE: \*\*SULFURIC ACID\*\*

TRADE NAMES/SYNONYMS:

OIL OF VIIRIOL; BOV; DIPPING ACID; VIIRIOL BROWN OIL; HYDROGEN SULFATE;  
 NORDHAUSEN ACID; DIHYDROGEN SULFATE; SULFURIC ACID; MATTING ACID  
 OTHIONIC ACID; STCC 4930040; UN 1830; A-300; A-300C; A-300-S1; A-300S;  
 A-298; A-310; A-468; SO-A-172; SO-A-174;

CHEMICAL FAMILY:  
 INORGANIC ACID

MOLECULAR FORMULA: H<sub>2</sub>S<sub>2</sub>O<sub>4</sub>

MOLECULAR WEIGHT: 98.07

OSHA RATINGS (SCALE 0-3): HEALTH=0 FIRE=0 REACTIVITY=0 PERSISTENCE=0  
 NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=0 REACTIVITY=2

COMPONENTS AND CONTAMINANTS

COMPONENT: SULFURIC ACID PERCENT: 98

COMPONENT: WATER PERCENT: 2

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

SULFURIC ACID:

1 MG/M<sup>3</sup> OSHA TWA

1 MG/M<sup>3</sup> ACGIH TWA; 3 MG/M<sup>3</sup> ACGIH STEL

1 MG/M<sup>3</sup> NIOSH RECOMMENDED 10 HOUR TWA

0554 100 MHC

100 POUNDS SARA SECTION 302 THRESHOLD PLANNING QUANTITY

1000 POUNDS SARA SECTION 304 REPORTABLE QUANTITY

1000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY

SUBJECT TO SARA SECTION 313 SPILL TOXIC CHEMICAL RELEASE REPORTING

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 PHYSICAL DATA

DESCRIPTION: COLORLESS, CLEAR, COLORLESS, DENSE HYGROSCOPIC OILY LIQUID WITH  
 A MARKED ACID TASTE WHEN PURE. BOILING POINT: 559 F (290 C)  
 MELTING POINT: 50 F (10 C) SPECIFIC GRAVITY: 1.84  
 VAPOR PRESSURE: <0.001 @ 20 C PH: <3 SOLUBILITY IN WATER: SOLUBLE  
 ODOR THRESHOLD: >1 MG/M3 VAPOR DENSITY: 3.4  
 SOLVENT SOLUBILITY: DECOMPOSES IN ETHYL ALCOHOL  
 @ 340 C IT DECOMPOSES INTO SULFUR TRIOXIDE AND WATER

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 FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:  
 NEGLIGIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

OXIDIZER: OXIDIZERS DECOMPOSE, ESPECIALLY WHEN HEATED, TO YIELD OXYGEN OR  
 OTHER GASES WHICH WILL INCREASE THE BURNING RATE OF COMBUSTIBLE MATTER.  
 CONTACT WITH EASILY OXIDIZABLE, ORGANIC, OR OTHER COMBUSTIBLE MATERIALS  
 MAY RESULT IN IGNITION, VIOLENT COMBUSTION OR EXPLOSION.

FIRFFIGHTING MEDIA:  
 DRY CHEMICAL, CARBON DIOXIDE OR HALON  
 (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

FOR LARGER FIRES, FLOOD AREA WITH WATER FROM A DISTANCE  
 (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

FIRE FIGHTING:  
 DO NOT GET SOLID STREAM OF WATER ON SPILLED MATERIAL. MOVE CONTAINERS FROM  
 FIRE AREA IF POSSIBLE. COOL CONTAINERS EXPOSED TO FLAMES WITH WATER FROM SIDE  
 UNTIL WELL AFTER FIRE IS OUT. KEEP AWAY FROM STORAGE TANK ENDS (1987 EMERGENCY  
 RESPONSE GUIDEBOOK, DOT P 5800.4 GUIDE PAGE 39).

USE AGENT SUITABLE FOR TYPE OF FIRE: USE FLOODING AMOUNTS OF WATER AS A FOAM.  
 COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER. APPLY FROM AS FAR A DISTANCE  
 AS POSSIBLE. AVOID BREATHING CORROSIVE VAPORS, KEEP UPWIND.

---

 TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49CFR172.101:  
 CORROSIVE MATERIAL

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49CFR172.101 AND SUBPART F:  
 CORROSIVE

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49CFR173.272  
 EXCEPTIONS: 49CFR173.244

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 TOXICITY

## SULFURIC ACID:

1380 UG EYE-RABBIT SEVERE IRRITATION; 100 MG EYE-RABBIT RINSED SEVERE IRRITATION; 3 MG/M<sup>3</sup>/24 WEEKS INHALATION-HUMAN TCLO; 510 MG/M<sup>3</sup>/2 HOURS INHALATION-RAT LC50; 320 MG/M<sup>3</sup> 2 HOURS INHALATION-MOUSE LC50; 18 MG/M<sup>3</sup> INHALATION-GUINEA PIG LC50; 2140 MG/KG ORAL-RAT LD50; 135 MG/KG (UNREPORTED-MAN LOLO; TUMORIGENIC DATA (AJEPAS 120(3), 358, 84).

CARCINOGEN STATUS: NONE.

SULFURIC ACID IS HIGHLY TOXIC, AND A SEVERE EYE, SKIN AND MUCCOUS MEMBRANE IRRITANT. POISONING MAY AFFECT THE BODY'S PH BALANCE AND IN TURN AFFECT THE NERVOUS SYSTEM.

---

## HEALTH EFFECTS AND FIRST AID

## INHALATION:

## SULFURIC ACID:

CORROSIVE/HIGHLY TOXIC. 80 MG/M<sup>3</sup> IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- INHALATION OF MISTS MAY CAUSE MUCCOUS MEMBRANE IRRITATION PRINCIPALLY AFFECTING THE RESPIRATORY TRACT EPITHELIUM. LOW CONCENTRATIONS, 0.35-5 MG/M<sup>3</sup>, MAY CAUSE INCREASED PULMONARY AIR FLOW-RESISTANCE AND SUBSEQUENT SHALLOWER AND MORE RAPID BREATHING. HOT CONCENTRATED MISTS MAY CAUSE RAPID LOSS OF CONSCIOUSNESS WITH POSSIBLE DAMAGE TO LUNG TISSUE. VAPORS MAY CAUSE NASAL SECRETIONS, SNEEZING, A BURNING OR TICKLING SENSATION IN THE NOSE AND THROAT AND RETROSTERNAL REGION, FOLLOWED BY COUGH, RESPIRATORY DISTRESS, TRACHEOBRONCHITIS, CHEMICAL PNEUMONITIS AND POSSIBLE SPASM OF THE VOCAL CORDS. HIGH CONCENTRATIONS MAY PRODUCE BLOODY NASAL SECRETIONS AND SFUTUM, HEMATEMESIS GASTRITIS, AND PULMONARY EDEMA. A SINGLE OVEREXPOSURE MAY LEAD TO LARYNGEAL, TRACHEOBRONCHIAL AND PULMONARY EDEMA. ONE INDIVIDUAL SPRAYED IN THE FACE WITH SULFURIC ACID LIQUID EXPERIENCED DELAYED SYMPTOMS OF PULMONARY FIBROSIS, RESIDUAL BRONCHITIS, AND PULMONARY EMPHYSEMA. VAPORS FROM DILUTE SOLUTIONS MAY IRRITATE MUCCOUS MEMBRANES.

CHRONIC EXPOSURE- REPEATED EXPOSURE TO THE MIST MAY CAUSE INFLAMMATION OF THE UPPER RESPIRATORY TRACT, CHRONIC BRONCHITIS AND ETCHING OF THE DENTAL ENAMEL. THE CENTRAL AND LATERAL INCISORS ARE PRIMARILY AFFECTED. REPEATED EXCESSIVE EXPOSURE OVER LONG PERIODS OF TIME HAVE RESULTED IN BRONCHITIC SYMPTOMS, RHINORRHEA, FREQUENT RESPIRATORY TRACT INFECTIONS, EMPHYSEMA, STOMATITIS AND DIGESTIVE DISTURBANCES. CHRONIC INHALATION MAY CAUSE ALKALINE DEPLETION OF THE BODY PRODUCING AN ACIDOSIS WHICH AFFECTS THE NERVOUS SYSTEM AND PRODUCES AGITATION, HESITANT GAIT AND GENERALIZED WEAKNESS. AN EPIDEMIOLOGICAL STUDY OF WORKERS AT A REFINERY AND CHEMICAL PLANT SUGGESTS AN INCREASED RISK OF LARYNGEAL CANCER FROM EXPOSURE TO HIGH CONCENTRATIONS OF SULFURIC ACID.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION. MAINTAIN AIRWAY AND BLOOD PRESSURE AND ADMINISTER OXYGEN IF AVAILABLE. KEEP AFFECTED PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:  
SULFURIC ACID:

**CORROSIVE.**

**ACUTE EXPOSURE-** CONTACT WITH CONCENTRATED SULFURIC ACID MAY CAUSE SEVERE SECOND AND THIRD DEGREE SKIN BURNS WITH NECROSIS DUE TO ITS AFFINITY FOR WATER AND SUBSEQUENT SEVERE DEHYDRATING ACTION, AND ITS EXOTHERMIC REACTION WITH MOISTURE. POSSIBLE CHARRING MAY OCCUR LEADING TO SHOCK AND COLLAPSE DEPENDING ON THE AMOUNT OF TISSUE INVOLVED. THE RESULTING WOUNDS MAY BE LONG IN HEALING AND MAY CAUSE EXTENSIVE SCARRING THAT MAY RESULT IN FUNCTIONAL INHIBITION. CONTACT WITH DILUTE SOLUTIONS MAY CAUSE SKIN IRRITATION.

**CHRONIC EXPOSURE-** REPEATED CONTACT WITH LOW CONCENTRATIONS MAY CAUSE SKIN DESICCATION AND ULCERATION OF THE HANDS, AND PANARIS OR CHRONIC FURULENT INFLAMMATION AROUND THE NAILS. REPEATED CONTACT WITH DILUTE SOLUTIONS MAY CAUSE DERMATITIS.

**FIRST AID-** REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). IN CASE OF CHEMICAL BURNS, COVER AREA WITH STERILE, DRY DRESSING. BANDAGE SECURELY, BUT NOT TOO TIGHTLY. GET MEDICAL ATTENTION IMMEDIATELY.

**EYE CONTACT:**  
**SULFURIC ACID:**  
**CORROSIVE.**

**ACUTE EXPOSURE-** EXPOSURE TO THE VAPORS MAY CAUSE A BURNING OR STINGING SENSATION IN THE EYES WITH LACRIMATION, BLURRED VISION AND CONJUNCTIVAL CONGESTION. SPLASHES OF ACID IN THE EYES MAY PRODUCE DEEP CORNEAL ULCERATION, KERATO-CONJUNCTIVITIS AND PALPEBRAL LESIONS WITH SEVERE SEQUELAE. IRREPARABLE CORNEAL DAMAGE AND BLINDNESS AS WELL AS SCARRING OF THE EYELIDS MAY OCCUR. SEVERE SULFURIC ACID EYE BURNS HAVE INCLUDED GLAUCOMA AND CATARACT AS COMPLICATIONS IN THE MOST SEVERE CASES. CONTACT WITH DILUTED ACID MAY PRODUCE MORE TRANSIENT EFFECTS FROM WHICH RECOVERY MAY BE COMPLETE.

**CHRONIC EXPOSURE-** REPEATED EXPOSURE MAY RESULT IN LACRIMATION AND CHRONIC CONJUNCTIVITIS.

**FIRST AID-** WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). CONTINUE IRRIGATING WITH NORMAL SALINE UNTIL THE PH HAS RETURNED TO NORMAL (30-60 MINUTES). COVER WITH STERILE BANDAGES. GET MEDICAL ATTENTION IMMEDIATELY.

**INGESTION:**  
**SULFURIC ACID:**  
**CORROSIVE:**

**ACUTE EXPOSURE-** INGESTION MAY CAUSE BURNING PAIN IN THE MOUTH, THROAT, ESOPHAGUS AND ABDOMEN, A SOUR TASTE AND NAUSEA FOLLOWED BY VOMITING AND DIARRHEA OF CHARRED BLACK STOMACH CONTENTS. DEHYDRATION AND CARBONIZATION OF TISSUE MAY OCCUR WITH ESCHARS ON THE LIPS AND MOUTH. BROWNISH OR YELLOWISH STAINS MAY BE FOUND AROUND THE MOUTH. INTENSE THIRST, DIFFICULT SWALLOWING, ACIDEMIA, STOMATITIS. RAPID AND WEAK PULSE, SHALLOW BREATHING, SHOCK AND POSSIBLE CONVULSIONS MAY OCCUR. ALBUMIN, BLOOD AND CASTS IN URINE, ANURIA, ESOPHAGEAL AND DELAYED GASTRIC STENOSIS HAS BEEN REPORTED. POSSIBLE PERFORATION OF THE GASTROINTESTINAL TRACT MAY RESULT IN PERITONITIS.

**CHRONIC EXPOSURE-** NO DATA AVAILABLE.

**FIRST AID-** DO NOT USE GASTRIC LAVAGE OR EMESIS. DILUTE THE ACID IMMEDIATELY BY DRINKING LARGE QUANTITIES OF WATER OR MILK. IF VOMITING PERSISTS.

ADMINISTER FLUIDS REPEATEDLY. INGESTED ACID MUST BE DILUTED APPROXIMATELY 100 FOLD TO RENDER IT HARMLESS TO TISSUES. MAINTAIN AIRWAY AND TREAT SHOCK. (DREISBACH, HANDBOOK OF POISONING, 12TH ED.). GET MEDICAL ATTENTION IMMEDIATELY. IF VOMITING OCCURS, KEEP HEAD BELOW HIPS TO HELP PREVENT ASPIRATION.

ANTIDOTE:  
NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

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REACTIVITY

REACTIVITY:  
VIOLENT EXOTHERMIC REACTION WITH WATER.

INCOMPATIBILITIES:

SULFURIC ACID:

ACETALDEHYDE: VIOLENTLY POLYMERIZED BY CONCENTRATED ACID.  
ACETIC ANHYDRIDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
ACETONE + NITRIC ACID: VIOLENT DECOMPOSITION.  
ACETONE + POTASSIUM DICHROMATE: IGNITION.  
ACETONE CYANHYDRIN: PRESSURE INCREASE WITH POSSIBLE EXPLOSIVE RUPTURE OF VESSEL.  
ACETONITRILE: VIOLENT EXOTHERM ON HEATING; SULFUR TRIOXIDE REDUCES INITIATION TEMPERATURE.  
ACROLEIN: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
ACRYLONITRILE: VIGOROUS EXOTHERMIC POLYMERIZATION.  
ALCOHOL: EXOTHERMIC REACTION AND CONTRACTION OF VOLUME.  
ALCOHOLS AND HYDROGEN PEROXIDE: POSSIBLE EXPLOSION.  
ALLYL ALCOHOL: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
ALLYL CHLORIDE: VIOLENT POLYMERIZATION.  
ALKYL NITRATES: MAY CAUSE VIOLENT REACTION.  
2-AMINOETHANOL: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
AMMONIUM HYDROXIDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
AMMONIUM IRON(III) SULFATE DODECACRYDRATE: VIOLENT, EXOTHERMIC REACTION ON HEATING.  
AMMONIUM TETRACHROMATE: FIRE OR EXPLOSION HAZARD.  
ANILINE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
BASES: VIOLENT REACTION.  
BENZYL ALCOHOL: MAY DECOMPOSES EXPLOSIVELY AT ABOUT 180 C.  
BROMATES + METALS: POSSIBLE IGNITION.  
BROMINE PENTAFLUORIDE: VIOLENT REACTION WITH POSSIBLE IGNITION.  
TERT-BUTYL M-XYLENE: VIOLENT EXOTHERMIC REACTION WITHOUT AGITATION.  
N-BUTYRALDEHYDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
CARBIDES: HAZARDOUS MIXTURE.  
CESTIM ACETYLIDE: IGNITION ON CONTACT.  
4-CHLORONITROBENZENE AND SULFUR TRIOXIDE: POSSIBLE EXPLOSIVE REACTION.  
CHLORATES: ALL CHLORATES, WHEN BROUGHT IN CONTACT WITH SULFURIC ACID MAY GIVE OFF EXPLOSIVE CHLORINE DIOXIDE GAS. A VIOLENT EXPLOSION IS USUAL.  
CHLORATES + METALS: POSSIBLE IGNITION.  
CHLORINE TRIFLUORIDE: VIOLENT REACTION.  
CHLOROSULFONIC ACID: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
CHROMATES: FIRE AND EXPLOSION HAZARD.  
COATINGS: ATTACKED.  
COMBUSTIBLE MATERIALS (FINELY DIVIDED): MAY IGNITE.  
COPPER: EVOLUTION OF SULFUR DIOXIDE.  
COPPOUS NITRIDE: VIOLENT REACTION.  
2-CYANO-4-NITROBENZENEDIAZONIUM HYDROGEN SULFATE: EXOTHERMIC REACTION.

2-CYANO-2-PROPANOL: VIOLENT REACTION WITH INCREASE IN PRESSURE.  
 CYCLOPENTADIENE: VIOLENT OR EXPLOSIVE REACTION.  
 CYCLOPENTANONE OXIME: VIOLENT REACTION.  
 1,3-DIAZIDOBENZENE: IGNITION FOLLOWED BY EXPLOSIVE REACTION.  
 DIETHYLAMINE: EXOTHERMIC REACTION.  
 DIISOBUTYLENE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 DIMETHYLBENZYL CARBINOL + HYDROGEN PEROXIDE: EXPLODES.  
 DIMETHOXYANTHRAQUINONE: EXOTHERMIC REACTION ABOVE 150 C.  
 2,5-DINITRO-3-METHYLBENZOIC ACID + SODIUM AZIDE: EXPLOSIVE REACTION.  
 1,5-DINITRONAPHTHALENE + SULFUR: EXOTHERMIC REACTION.  
 EPICHLOROHYDRIN: VIOLENT REACTION.  
 ETHOXYLATED NONYLPHENOL: POSSIBLE IGNITION.  
 ETHANOL + HYDROGEN PEROXIDE: POSSIBLE EXPLOSION.  
 ETHYLENE CYANOHYDRIN: VIOLENT REACTION.  
 ETHYLENE DIAMINE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 ETHYLENE GLYCOL: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 ETHYLENIMINE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 FULMINATES: EXTREMELY HAZARDOUS MIXTURE.  
 HEXALITHIUM DISILICIDE: INCANDESCENT REACTION.  
 HYDROCHLORIC ACID: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 HYDROGEN PEROXIDE (>50%): EXPLOSIVE REACTION AFTER EVAPORATION.  
 HYDROFLUORIC ACID: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 INDANE + NITRIC ACID: POSSIBLE EXPLOSION.  
 IODINE HEPTAFLUORIDE: THE ACID BECOMES EFFERVESCENT.  
 IRON: POSSIBLE EXPLOSION DUE TO HYDROGEN GAS FROM THE ACID-METAL REACTION.  
 ISOPRENE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 LITHIUM SILICIDE: INCANDESCENT REACTION.  
 MERCURY NITRIDE: EXPLOSION ON CONTACT.  
 MESITYL OXIDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 METALS: MAY LIBERATE FLAMMABLE HYDROGEN GAS.  
 METALS (POWDERED): EXTREMELY HAZARDOUS MIXTURE.  
 METAL ACETYLIDES: IGNITION REACTION.  
 METAL CHLORATES: VIOLENT EXPLOSION UNLESS PROPERLY COOLED.  
 METAL PERCHLORATES: FORMATION OF EXPLOSIVE PERCHLORIC ACID.  
 4-METHYLPYRIDINE: EXOTHERMIC REACTION.  
 NITRAMIDE: MAY DECOMPOSE EXPLOSIVELY ON CONTACT.  
 NITRATES: INCOMPATIBLE.  
 NITRIC ACID + GLYCERIDES: EXPLOSION.  
 NITRIC ACID + ORGANIC MATERIAL: MAY CAUSE VIOLENT REACTION.  
 NITRIC ACID + TOLUENE: POSSIBLE VIOLENT REACTION OR EXPLOSION.  
 NITROARYL BASES AND DERIVATIVES: MAY CAUSE VIOLENT REACTION OR EXPLOSION.  
 NITROBENZENE: EXOTHERMIC REACTION AT ELEVATED TEMPERATURES.  
 3-NITROBENZENESULFONIC ACID: EXOTHERMIC REACTION.  
 NITROMETHANE: FORMATION OF EXPLOSIVE MIXTURE.  
 N-NITROMETHYLAMINE: EXPLOSIVE DECOMPOSITION.  
 4-NITROTOLUENE: EXPLOSIVE AT 80 C.  
 ORGANICS: VIOLENT EXOTHERMIC REACTION.  
 FENTASILVER TRIHYDROXYOTAMIDOPHOSPHATE: EXPLOSION ON CONTACT.  
 PERCHLORATES: POSSIBLE EXPLOSION.  
 PERCHLORIC ACID: FORMATION OF DANGEROUS ANHYDROUS PERCHLORIC ACID.  
 PERMANGANATES: FORMATION OF PERMANGANIC ACID.  
 PERMANGANATES + BENZENE: POSSIBLE EXPLOSION.  
 1-PHENYL-2-METHYL-PROPYL ALCOHOL + HYDROGEN PEROXIDE: POSSIBLE EXPLOSION.  
 PHOSPHORUS (WHITE OR YELLOW): IGNITION IN CONTACT WITH BOILING ACID.  
 PHOSPHORUS ISOCYANATE: VIOLENT REACTION.  
 PHOSPHORUS TRIOXIDE: VIOLENT OXIDATION WITH POSSIBLE IGNITION.  
 PICRATES: EXTREMELY HAZARDOUS MIXTURE.  
 PLASTICS: ATTACKED.



POLYETHYLENE: EXPLOSION ON CONTACT.  
 POTASSIUM: EXPLOSIVE INTERACTION.  
 POTASSIUM TERT-BUTOXIDE: IGNITION.  
 POTASSIUM CHLORATE: POSSIBLE FIRE AND EXPLOSION.  
 POTASSIUM PERMANGANATE: POSSIBLE EXPLOSION IN THE PRESENCE OF MOISTURE.  
 POTASSIUM PERMANGANATE + POTASSIUM CHLORIDE: VIOLENT EXPLOSION.  
 PROPIONOLACTONE (BETA): TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 PROPYLENE OXIDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 3-PROPYNOL: POSSIBLE EXPLOSION UNLESS ADEQUATELY COOLED.  
 PYRIDINE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 REACTING AGENTS: REACTS.  
 RUBBER: ATTACKED.  
 URIDIUM ACETYLIDE: IGNITION ON CONTACT.  
 SILVER PERMANGANATE (MOIST): EXPLOSIVE REACTION.  
 SILVER PEROXOCHROMATE: EXPLOSIVE REACTION.  
 SODIUM: EXPLOSIVE REACTION WITH AQUEOUS ACID.  
 SODIUM CARBONATE: VIOLENT REACTION.  
 SODIUM CHLORATE: POSSIBLE FIRE OR EXPLOSION.  
 SODIUM HYDROXIDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 SODIUM TETRAHYDROBORATE: VIOLENT, EXOTHERMIC REACTION.  
 SODIUM THIOCYANATE: VIOLENT EXOTHERMIC WITH EVOLUTION OF CARBONYL SULFIDE.  
 STEEL: POSSIBLE EXPLOSION DUE TO HYDROGEN GAS FROM THE ACID-METAL REACTION.  
 STYRENE MONOMER: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 TETRAETHYLBENZENES: VIOLENT REACTION IN CLOSED CONTAINERS.  
 1,2,4,5-TETRAZINE: VIOLENT DECOMPOSITION ON CONTACT.  
 THALLIUM(I) AZIDODITHIOCARBONATE: MAY EXPLODE ON CONTACT.  
 1,3,5-TRIMETHYLOXYHYDRO-1,3,5-TRIAZINE: EXPLOSIVE DECOMPOSITION ON CONTACT.  
 VINYL ACETATE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 ZINC CHLORATE: LIVELY TO CAUSE FIRES AND EXPLOSIONS.  
 ZINC IODIDE: VIOLENT INTERACTION.

DECOMPOSITION:  
 THERMAL DECOMPOSITION MAY RELEASE TOXIC OXIDES OF SULFUR.

POLYMERIZATION:  
 HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

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**STORAGE AND DISPOSAL**

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

**\*\*STORAGE\*\***

PROTECT AGAINST PHYSICAL DAMAGE AND WATER. SEPARATE FROM CARBIDES, CHLORATES, FLUORINATES, NITRATES, PICRATES, POWDERED METALS, AND COMPATIBLE MATERIALS (MPCA 49, HAZARDOUS CHEMICALS DATA, 1975).

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

THRESHOLD PLANNING QUANTITY (TPQ):  
 THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 302 REQUIRES THAT EACH FACILITY WHERE AN EXTREMELY HAZARDOUS SUBSTANCE IS PRESENT IN A

QUANTITY EQUAL TO OR GREATER THAN THE TQ ESTABLISHED FOR THAT SUBSTANCE  
 NOTIFY THE STATE EMERGENCY RESPONSE COMMISSION FOR THE STATE IN WHICH IT IS  
 LOCATED. SECTION 303 OF SARA REQUIRES THESE FACILITIES TO PARTICIPATE IN LOCAL  
 EMERGENCY RESPONSE PLANNING (40 CFR 355.30).

**\*\*DISPOSAL\*\***

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF  
 HAZARDOUS WASTE. 40 CFR 262. EPA HAZARDOUS WASTE NUMBER 0002.

100 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

\*\*\*\*\*  
**CONDITIONS TO AVOID**

MAY IGNITE OTHER COMBUSTIBLE MATERIALS (WOOD, PAPER, OIL, ETC.). VIOLENT  
 REACTION WITH WATER. FLAMMABLE. POISONOUS GASES MAY ACCUMULATE IN CLOSED  
 SPACES. RUNOFF TO SEWER MAY CREATE FIRE OR EXPLOSION HAZARD.

\*\*\*\*\*  
**SPILL AND LEAK PROCEDURES**

**SOIL SPILL:**  
 USE HOLDING AREA SUCH AS LAGOON, POND OR PIT FOR CONTAINMENT.

DIKE FLOW OF SPILLED MATERIAL USING SOIL OR SANDBAGS OR FORMED BARRIERS SUCH  
 AS POLYURETHANE OR CONCRETE.

USE CEMENT POWDER OR FLY ASH TO ABSORB LIQUID MASS.

NEUTRALIZE SPILL WITH SLAKED LIME, SODIUM BICARBONATE OR CRUSHED LIMESTONE.

**AIR SPILL:**  
 APPLY WATER SPRAY TO KNOCK DOWN AND REDUCE VAPORS. KNOCK-DOWN WATER IS  
 CORROSIVE AND TOXIC AND SHOULD BE DIKED FOR CONTAINMENT AND LATER DISPOSAL.

**WATER SPILL:**  
 NEUTRALIZE WITH AGRICULTURAL LIME, SLAKED LIME, CRUSHED LIMESTONE, OR SODIUM  
 BICARBONATE.

**OCCUPATIONAL SPILL:**  
 KEEP COMBUSTIBLES (WOOD, PAPER, OIL, ETC.) AWAY FROM SPILLED MATERIAL. DO NOT  
 TOUCH SPILLED MATERIAL. DO NOT GET WATER INSIDE CONTAINER. STOP LEAK IF YOU  
 CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. DO NOT PUT WATER ON  
 LEAK OR SPILL AREA. CLEAN UP ONLY UNDER THE SUPERVISION OF AN EXPERT. DIKE  
 SPILL FOR LATER DISPOSAL. DO NOT APPLY WATER UNLESS DIRECTED TO DO SO. KEEP  
 UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND GAIN ENTRY. VENTILATE CLOSED  
 SPACES BEFORE ENTERING.

**REPORTABLE QUANTITY (RQ): 1000 POUNDS**  
 THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES  
 THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS  
 SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE  
 AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF  
 THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE  
 CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE

PROTECTIVE EQUIPMENT

VENTILATION:

FACILITY ENCLOSURE RECOMMENDED TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:

THE FOLLOWING RESPIRATORS AND MAXIMUM USE CONCENTRATIONS ARE RECOMMENDATIONS BY THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, NIOSH POCKET GUIDE TO CHEMICAL HAZARDS; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29CFR1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

SULFURIC ACID:

25 mg/m<sup>3</sup>- ANY POWERED AIR-PURIFYING RESPIRATOR WITH AN ACID GAS CARTRIDGE(S) AND HAVING A HIGH-EFFICIENCY PARTICULATE FILTER.  
ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS FLOW MODE.

50 mg/m<sup>3</sup>- ANY CHEMICAL CARTRIDGE RESPIRATOR WITH A FULL FACEPIECE AND ACID GAS CARTRIDGE(S) IN COMBINATION WITH A HIGH EFFICIENCY PARTICULATE FILTER.  
ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.  
ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.  
ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE OR FRONT- OR BACK-MOUNTED ACID GAS CANISTER HAVING A HIGH-EFFICIENCY PARTICULATE FILTER.

90 mg/m<sup>3</sup>- ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE AND OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ESCAPE- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE OR FRONT- OR BACK-MOUNTED ACID GAS CANISTER HAVING A HIGH-EFFICIENCY PARTICULATE FILTER.  
ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE.

SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE AND OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

CLOTHING:

WEAR APPROPRIATE PROTECTIVE CLOTHING TO AVOID ANY POSSIBILITY OF SKIN CONTACT WITH LIQUIDS CONTAINING MORE THAN 1% SULFURIC ACID. AVOID REPEATED OR PROLONGED SKIN CONTACT WITH LIQUIDS CONTAINING 1% OR LESS SULFURIC ACID.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS

SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE.

EMERGENCY WASH FACILITIES:

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

AUTHORIZED - FISHER SCIENTIFIC, INC.  
CREATION DATE: 11/28/84 REVISION DATE: 09/05/89

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\*\*\*NITRIC ACID\*\*  
 \*\*\*NITRIC ACID\*\*  
 \*\*\*NITRIC ACID\*\*

MATERIAL SAFETY DATA SHEET

FISHER SCIENTIFIC  
 CHEMICAL DIVISION  
 1 REAGENT LANE  
 FAIR LAWN NJ 07410  
 (201) 796-7100

EMERGENCY NUMBER: (201) 796-7100  
 CHEMTEC ASSISTANCE: (800) 424-9300

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SUBSTANCE IDENTIFICATION

CAS-NUMBER 7697-37-2

SUBSTANCE: \*\*\*NITRIC ACID\*\*

TRADE NAMES/SYNONYMS:

AQUA FORTIS; WFNA; RFNA; HYDROGEN NITRATE; AZOTIC ACID; NITRYL HYDROXIDE;  
 METAL: STEC 4919528; UN 2031;  
 A-200; A-200-C; A-200-S; A-202; A-206-C; A-509; A-467; HNO3; 74;

CHEMICAL FAMILY:  
 INORGANIC ACID

MOLECULAR FORMULA: H-N-O3

MOLECULAR WEIGHT: 63.01

OSHA RATINGS (SCALE 0-3): HEALTH=3 FIRE=0 REACTIVITY=1 PERSISTENCE=0  
 NFPA RATINGS (SCALE 0-4): HEALTH=3 FIRE=0 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: NITRIC ACID PERCENT: 70

COMPONENT: WATER PERCENT: 30

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

NITRIC ACID:  
 2 PPM (5 MG/M3) OSHA TWA; 4 PPM (10 MG/M3) OSHA STEL  
 2 PPM (5 MG/M3) ACGIH TWA; 4 PPM (10 MG/M3) ACGIH STEL  
 2 PPM NIOSH RECOMMENDED 10 HOUR TWA

1000 POUNDS SARA SECTION 302 THRESHOLD PLANNING QUANTITY  
 1000 POUNDS SARA SECTION 304 REPORTABLE QUANTITY  
 1000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY  
 SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

CHM 001 0564

PHYSICAL DATA

DESCRIPTION: COLORLESS TO PALE YELLOW LIQUID WITH A SUFFOCATING ODDOR.  
 BOILING POINT: 181 F (83 C) MELTING POINT: -44 F (-42 C)  
 SPECIFIC GRAVITY: 1.5027 @ 25 C VAPOR PRESSURE: 47.9 MMHG @ 20 C  
 EVAPORATION RATE: NOT AVAILABLE SOLUBILITY IN WATER: VERY SOLUBLE  
 VAPOR DENSITY: 3.2  
 SOLVENT SOLUBILITY: SOLUBLE IN ETHER.

FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:  
 NEGLIGIBLE FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

OXIDIZER: OXIDIZERS DECOMPOSE, ESPECIALLY WHEN HEATED, TO YIELD OXYGEN OR OTHER GASES WHICH WILL INCREASE THE BURNING RATE OF COMBUSTIBLE MATTER. CONTACT WITH EASILY OXIDIZABLE, ORGANIC, OR OTHER COMBUSTIBLE MATERIALS MAY RESULT IN IGNITION, VIOLENT COMBUSTION OR EXPLOSION.

FIREFIGHTING MEDIA:  
 WATER, DRY CHEMICAL OR SODA ASH  
 (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

FOR LARGER FIRES, FLOOD AREA WITH WATER FROM A DISTANCE  
 (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

FIREFIGHTING:  
 MOVE CONTAINER FROM FIRE AREA IF POSSIBLE. COOL CONTAINERS EXPOSED TO FLAMES WITH WATER FROM SIDE UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM STORAGE TANK ENDS. FOR MASSIVE FIRE IN STORAGE AREA, USE UNMANNED HOSE HOLDER OR MONITOR NOZZLES; ELSE WITHDRAW FROM AREA AND LET FIRE BURN (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4, GUIDE PAGE 44).

USE FLOODING AMOUNTS OF WATER AS FOG. COOL CONTAINERS WITH FLOODING AMOUNTS OF WATER, APPLY FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING CORROSIVE VAPORS. KEEP UPWIND. CONSIDER EVACUATION OF DOWNWIND AREA IF MATERIAL IS LEAKING.

TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49CFR172.101:  
 OXIDIZER

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49CFR173.101 AND SUBPART F:  
 OXIDIZER AND CORROSIVE

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49CFR173.269  
 EXCEPTIONS: NONE

TOXICITY

NITRIC ACID:

TOXICITY DATA:

AMPHIBIOUS: 110 MG/KG UNREPORTED-MAN LOUD; REPRODUCTION EFFECTS DATA (FELS)  
 MONOHYDRATE: NO DATA AVAILABLE.  
 TRIHYDRATE: NO DATA AVAILABLE.

CARCINOGEN STATUS: NONE.

LOCAL EFFECTS: CORROSIVE- INHALATION, SKIN, EYES, INGESTION.

ACUTE TOXICITY LEVEL: INSUFFICIENT DATA.

INSECT EFFECTS: NO DATA AVAILABLE.

AT INCREASED RISK FROM EXPOSURE: PERSONS WITH IMPAIRED LUNG/OLBY FUNCTION.

PRE-EXISTING EYE AND SKIN DISORDERS.

HEALTH EFFECTS AND FIRST AID

INHALATION:

NITRIC ACID:

CORROSIVE. 100 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- INHALATION OF ACIDIC SUBSTANCES MAY CAUSE SEVERE RESPIRATORY IRRITATION WITH COUGHING, CHOKING, AND POSSIBLY YELLOWISH BURNS OF THE MUCOUS MEMBRANES. OTHER INITIAL SYMPTOMS MAY INCLUDE DIZZINESS, HEADACHE, NAUSEA, AND WEAKNESS. PULMONARY EDEMA MAY BE IMMEDIATE IN THE MOST SEVERE EXPOSURES, BUT MORE LIKELY WILL OCCUR AFTER A LATENT PERIOD OF 5-72 HOURS. THE SYMPTOMS MAY INCLUDE TIGHTNESS IN THE CHEST, DYSPNEA, DIZZINESS, FROTHY SPUTUM, AND CYANOSIS. PHYSICAL FINDINGS MAY INCLUDE HYPOTENSION, WEAK, RAPID PULSE, MOIST RALES, AND HEMOCONCENTRATION. IN NON-FATAL CASES, COMPLETE RECOVERY MAY OCCUR WITHIN A FEW DAYS OR WEEKS OR, CONVALESCENCE MAY BE PROLONGED WITH FREQUENT RELAPSES AND CONTINUED DYSPNEA AND OTHER SIGNS AND SYMPTOMS OF PULMONARY INSUFFICIENCY. IN SEVERE EXPOSURES, DEATH DUE TO ANOXIA MAY OCCUR WITHIN A FEW HOURS AFTER ONSET OF THE SYMPTOMS OF PULMONARY EDEMA OR FOLLOWING A RELAPSE.

CHRONIC EXPOSURE- DEPENDING ON THE CONCENTRATION AND DURATION OF EXPOSURE, REPEATED OR PROLONGED EXPOSURE TO AN ACIDIC SUBSTANCE MAY CAUSE EROSION OF THE TEETH, INFLAMMATORY AND ULCERATIVE CHANGES IN THE MOUTH, AND POSSIBLY JAW NECROSIS. BRONCHIAL IRRITATION WITH COUGH AND FREQUENT ATTACKS OF BRONCHIAL PNEUMONIA MAY OCCUR. GASTROINTESTINAL DISTURBANCES ARE ALSO POSSIBLE.

FIRST AID- REMOVE FROM EXPOSURE AREA TO FRESH AIR IMMEDIATELY. IF BREATHING HAS STOPPED, GIVE ARTIFICIAL RESPIRATION. MAINTAIN AIRWAY AND BLOOD PRESSURE AND ADMINISTER OXYGEN IF AVAILABLE. KEEP AFFECTED PERSON WARM AND AT REST. TREAT SYMPTOMATICALLY AND SUPPORTIVELY. ADMINISTRATION OF OXYGEN SHOULD BE PERFORMED BY QUALIFIED PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

SKIN CONTACT:

NITRIC ACID:

CORROSIVE.

ACUTE EXPOSURE- DIRECT CONTACT WITH LIQUID OR VAPOR MAY CAUSE SEVERE PAIN, BURNS AND POSSIBLY YELLOWISH STAINS. BURNS MAY BE DEEP WITH SHARP EDGES AND HEAL SLOWLY WITH SCAR TISSUE FORMATION. DILUTE SOLUTIONS OF NITRIC ACID MAY PRODUCE MILD IRRITATION AND HARDEN THE EPIDERMIS WITHOUT DESTROYING IT.

CHRONIC EXPOSURE- EFFECTS DEPEND ON THE CONCENTRATION AND DURATION OF EXPOSURE. REPEATED OR PROLONGED CONTACT WITH ACIDIC SUBSTANCES MAY RESULT IN KERATITIS OR EFFECTS SIMILAR TO ACUTE EXPOSURE.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). IN CASE OF CHEMICAL BURNS, COVER AREA WITH STERILE, DRY DRESSING. BANDAGE SECURELY, BUT NOT TOO TIGHTLY. GET MEDICAL ATTENTION IMMEDIATELY.

EYE CONTACT:  
NITRIC ACID:  
CORROSIVE.

ACUTE EXPOSURE- DIRECT CONTACT WITH ACIDIC SUBSTANCES MAY CAUSE PAIN AND LACRIMATION, PHOTOPHOBIA, AND BURNS, POSSIBLY SEVERE. THE DEGREE OF INJURY DEPENDS ON THE CONCENTRATION AND DURATION OF CONTACT. IN MILD BURNS, THE EPITHELIUM REGENERATES RAPIDLY AND THE EYE RECOVERS COMPLETELY. IN SEVERE CASES, THE EXTENT OF INJURY MAY NOT BE FULLY APPARENT FOR SEVERAL WEEKS. ULTIMATELY, THE WHOLE CORNEA MAY BECOME DEEPLY VASCULARIZED AND OPACIFIED RESULTING IN BLINDNESS. IN THE WORST CASES, THE EYE MAY BE TOTALLY DESTROYED. CONCENTRATED NITRIC ACID MAY IMPART A YELLOW COLOR TO THE EYE UPON CONTACT.

CHRONIC EXPOSURE- EFFECTS DEPEND ON THE CONCENTRATION AND DURATION OF EXPOSURE. REPEATED OR PROLONGED EXPOSURE TO ACIDIC SUBSTANCES MAY CAUSE CONJUNCTIVITIS OR EFFECTS AS IN ACUTE EXPOSURE.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (AT LEAST 15-20 MINUTES). CONTINUE IRRIGATING WITH NORMAL SALINE UNTIL THE PH HAS RETURNED TO NORMAL (30-60 MINUTES). COVER WITH STERILE BANDAGES. GET MEDICAL ATTENTION IMMEDIATELY.

INGESTION:  
NITRIC ACID:  
CORROSIVE.

ACUTE EXPOSURE- ACIDIC SUBSTANCES MAY CAUSE CIRCUMFERENTIAL BURNS WITH YELLOW DISCOLORATION AND CORROSION OF THE MUCOUS MEMBRANES OF THE MOUTH, THROAT AND ESOPHAGUS. THERE MAY BE IMMEDIATE PAIN AND DIFFICULTY OR INABILITY TO SWALLOW OR SPEAK. EPIGLOTTAL EDEMA MAY RESULT IN RESPIRATORY DISTRESS AND POSSIBLY ASPHYXIA. MARKED THIRST, EPIGASTRIC PAIN, NAUSEA, VOMITING AND DIARRHEA MAY OCCUR. DEPENDING ON THE DEGREE OF ESOPHAGEAL AND GASTRIC CORROSION, THE VOMITUS MAY CONTAIN FRESH OR DARK PRECIPITATED BLOOD AND LARGE SHEETS OF MUCOSA. SHOCK WITH MARKED HYPOTENSION, WEAK, RAPID PULSE, SHALLOW RESPIRATION, AND CLAMMY SKIN MAY OCCUR. CIRCULATORY COLLAPSE MAY ENSUE AND IF UNCORRECTED, LEAD TO RENAL FAILURE. IN SEVERE CASES, GASTRIC AND TO A LESSEER DEGREE, ESOPHAGEAL PERFORATION AND SUBSEQUENT PERITONITIS MAY OCCUR AND BE ACCOMPANIED BY FEVER AND ABDOMINAL RIGIDITY. ESOPHAGEAL, GASTRIC AND PYLORIC STRICTURE MAY OCCUR WITHIN A FEW WEEKS, BUT MAY BE DELAYED FOR MONTHS OR EVEN YEARS. DEATH MAY RESULT WITHIN A SHORT TIME FROM ASPHYXIA, CIRCULATORY COLLAPSE OR ASPIRATION OF EVEN MINUTE AMOUNTS. LATER DEATH MAY BE DUE TO PERITONITIS, SEVERE NEPHRITIS OR PNEUMONIA. COMA AND CONVULSIONS SOMETIMES OCCUR TERMINALLY.

CHRONIC EXPOSURE- DEPENDING ON THE CONCENTRATION, REPEATED INGESTION OF ACIDIC SUBSTANCES MAY RESULT IN INFLAMMATORY AND ULCERATIVE CHANGES IN THE MUCOUS MEMBRANES OF THE MOUTH AND OTHER EFFECTS AS IN ACUTE INGESTION. REPRODUCTIVE EFFECTS HAVE BEEN REPORTED IN ANIMALS.

FIRST AID- DO NOT USE GASTRIC LAVAGE OR EMESIS. DILUTE THE ACID IMMEDIATELY



BY DRINKING LARGE QUANTITIES OF WATER OR MILK. IF VOMITING PERSISTS, ADMINISTER FLUIDS REPEATEDLY. INGESTED ACID MUST BE DILUTED APPROXIMATELY 100 FOLD TO RENDER IT HARMLESS TO TISSUES. MAINTAIN AIRWAY AND TREAT SYMPTOMS (LORETSBACH, HANDBOOK OF POISONING, 12TH ED.). GET MEDICAL ATTENTION IMMEDIATELY. IF VOMITING OCCURS, KEEP HEAD BELOW NEPS TO HELP PREVENT ASPIRATION.

## ANTIDOTE:

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

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 REACTIVITY

## REACTIVITY:

REACTS EXOTHERMICALLY WITH WATER.

## INCOMPATIBILITIES:

## NITRIC ACID:

ACETIC ACID: MAY REACT EXPLOSIVELY.  
 ACETIC ANHYDRIDE: EXPLOSIVE REACTION BY FRICTION OR IMPACT.  
 ACETONE: MAY REACT EXPLOSIVELY.  
 ACETONITRILE: EXPLOSIVE MIXTURE.  
 4-ACETOXY-3-METHOXYBENZALDEHYDE: EXOTHERMIC REACTION.  
 ACRYLEIN: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 ACRYLONITRILE: EXPLOSIVE REACTION AT 90 C.  
 ACRYLONITRILE-METHACRYLATE COPOLYMER: INCOMPATIBLE.  
 ALCOHOLS: POSSIBLE VIOLENT REACTION OR EXPLOSION; FORMATION OF EXPLOSIVE COMPOUND IN THE PRESENCE OF HEAVY METALS.  
 ALIPHATHOLS: EXOTHERMIC REACTION WITH POSSIBLE IGNITION.  
 2-ALKOXY-1,3-DITHIA-2-PHOSPHOLANE: IGNITION REACTION.  
 ALLYL ALCOHOL: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 ALLYL CHLORIDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 AMINES (ALIPHATIC OR AROMATIC): POSSIBLE IGNITION REACTION.  
 2-AMINOETHANOL: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 2-AMINOTHIAZOLE : EXPLOSIVE REACTION.  
 AMMONIA (GAS): BURNS IN AN ATMOSPHERE OF NITRIC ACID VAPOR.  
 AMMONIUM HYDROXIDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 AMMONIUM NITRATE: FORMS EXPLOSIVE MIXTURE.  
 ANILINE: IGNITES ON CONTACT.  
 ANILINIUM NITRATE: FORMS EXPLOSIVE SOLUTION.  
 ANION EXCHANGE RESINS: POSSIBLE VIOLENT EXOTHERMIC REACTION.  
 ANTIMONY: VIOLENT REACTION.  
 ARSINE: EXPLOSIVE REACTION.  
 ARSINE-BORON TRIBROMIDE: VIOLENT OXIDATION.  
 BASES: REACTS.  
 BENZENE: EXPLOSIVE REACTION.  
 BENZIDINE: SPONTANEOUS IGNITION.  
 BENZONITRILE: POSSIBLE EXPLOSION.  
 BENZOTHIOPHENE DERIVATIVES: FORMATION OF POSSIBLY EXPLOSIVE COMPOUNDS.  
 N-BENZYL-N-ETHYLANILINE: VIGOROUS DECOMPOSITION.  
 1,4-BIS(METHOXYMETHYL)2,3,5,6-TETRAMETHYLBENZENE: GAS EVOLUTION.  
 BISMUTH: INTENSE EXOTHERMIC REACTION OR EXPLOSION.  
 1,3-BIS(TRIFLUOROMETHYL)BENZENE: POSSIBLE EXPLOSION.  
 BORON: VIOLENT REACTION WITH INCANDESCENCE.  
 BORON DECAHYDRIDE: EXPLOSIVE REACTION.  
 BORON PHOSPHIDE: IGNITION REACTION.  
 BORONINE PENTAFLUORIDE: IGNITION REACTION.  
 N-BUTYL MERCAPTAN: IGNITION REACTION.

4-BUTYRALDEHYDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 ARSENIC TRISULFIDE: EXPLOSIVE REACTION.  
 CALCIUM HYDROPHOSPHITE: IGNITION REACTION.  
 CARBON (FULVERIZED): VIOLENT REACTION.  
 CELLULOSE: FORMS EASILY COMBUSTIBLE ESTER.  
 CHLORATES: REACTS.  
 CHLORINE: INCOMPATIBLE.  
 CHLORINE TRIFLUORIDE: VIOLENT REACTION.  
 CHLOROBENZENE: POSSIBLE EXPLOSION.  
 4-CHLORO-2-NITROANILINE: FORMS EXPLOSIVE COMPOUND.  
 CHLOROSULFONIC ACID: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 COAL: EXPLOSIVE MIXTURE.  
 COATINGS: MAY BE ATTACKED.  
 CRESOL: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 CROTONALDEHYDE: VIOLENT DECOMPOSITION WITH IGNITION.  
 CUMENE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 CUPRIC NITRIDE: EXPLOSIVE REACTION.  
 CUPROUS NITRIDE: VIOLENT REACTION.  
 CYANATES: POSSIBLE EXPLOSIVE REACTION.  
 CYCLOHEXANONE: VIOLENT REACTION.  
 CYCLOHEXYLAMINE: FORMS EXPLOSIVE COMPOUND.  
 CYCLOPENTADIENE: EXPLOSIVE REACTION.  
 1,2-DIAMINOLTHANE BIS(TRIMETHYLGOLD): EXPLOSIVE REACTION.  
 DIBORANE: SPONTANEOUS IGNITION.  
 DI-2-BUTOXYETHYL ETHER: VIOLENT DECOMPOSITION REACTION.  
 2,6-DI-1-BUTYL PHENOL: FORMATION OF EXPLOSIVE COMPOUND.  
 DICHLOROETHANE: FORMS SHOCK AND HEAT SENSITIVE MIXTURE.  
 DICHLOROETHYLENE: FORMS EXPLOSIVE COMPOUND.  
 DICHLOROMETHANE: FORMS EXPLOSIVE SOLUTION.  
 DICYCLOPENTADIENE: SPONTANEOUS IGNITION.  
 DIEMES: IGNITION REACTION.  
 DIETHYLAMINO ETHANOL: POSSIBLE EXPLOSION.  
 DIETHYL ETHER: POSSIBLE EXPLOSION.  
 3,4-DIHYDRO-1,2,2H-DYAZINE: EXPLOSIVE INTERACTION.  
 DIISOPROPYL ETHER: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 DIMETHYLAMINOMETHYLFERROCENE: VIOLENT DECOMPOSITION IF HEATED.  
 DIMETHYL ETHER: FORMS EXPLOSIVE COMPOUND.  
 DIMETHYL HYDRAZINE: IGNITES ON CONTACT.  
 DIMETHYL SULFOXIDE + 1,4-DIOXANE: EXPLOSION.  
 DIMETHYL SULFOXIDE + 14% WATER: EXPLOSIVE REACTION.  
 DINITROBENZENE: EXPLOSION HAZARD.  
 DINITROTOLUENE: EXPLOSIVE REACTION.  
 DIOXANE + PERCHLORIC ACID: POSSIBLE EXPLOSION.  
 DIPHENYL DISTIBENE: EXPLOSIVE OXIDATION.  
 DIPHENYL MERCURY + CARBON DISULFIDE: VIOLENT REACTION.  
 DIPHENYL TIN: IGNITION REACTION.  
 DISODIUM PHENYL ORTHOPHOSPHATE: VIOLENT EXPLOSION.  
 DIVINYL ETHER: POSSIBLE IGNITION REACTION.  
 EPICHLOROHYDRIN: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 ETHANESULFONAMIDE: EXPLOSIVE REACTION.  
 ETHOXY-ETHYLENE DITHIOPHOSPHATE: IGNITION ON CONTACT.  
 N-ETHYL ANILINE: IGNITION REACTION.  
 ETHYLENE DIAMINE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 ETHYLENE GLYCOL: FORMS SHOCK AND HEAT SENSITIVE MIXTURE.  
 ETHYLENEMINE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 5-ETHYL-2-METHYL PYRIDINE: EXPLOSIVE REACTION.  
 ETHYL PHOSPHINE: IGNITION REACTION.  
 5-ETHYL-2-PICOLINE: FORMS EXPLOSIVE COMPOUNDS.

PEROXIDE (POWDERED): INTENSE EXOTHERMIC REACTION.  
 FLUORINE: POSSIBLE EXPLOSIVE REACTION.  
 FORMIC ACID: EXOTHERMIC REACTION WITH RELEASE OF TOXIC GASES.  
 2-FORMYLAMINO-1-PHENYL-1,3-PROPANEDIOL: POSSIBLE EXPLOSION.  
 FUEL OIL (BURNING): EXPLOSION.  
 FUMIGATES: REACTS.  
 FURFURYLDIENE KETONES: IGNITES ON CONTACT.  
 GERMANIUM: VIOLENT REACTION.  
 GLYCERIN: POSSIBLE EXPLOSION.  
 GLYOXAL: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 HEXALITHIUM DISILICIDE: EXPLOSIVE REACTION.  
 HEXAMETHYLBENZENE: POSSIBLE EXPLOSION.  
 2,2,4,4,6,6-HEXAMETHYLTRITHIARE: EXPLOSIVE OXIDATION.  
 HEXENAL: EXPLODES ON HEATING.  
 HYDRAZINE: VIOLENT REACTION.  
 HYDRAZOIC ACID: ENERGETIC REACTION.  
 HYDROGEN IODIDE: IGNITION REACTION.  
 HYDROGEN PEROXIDE: FORMS UNSTABLE MIXTURE.  
 HYDROGEN PEROXIDE AND KETONES: FORMS EXPLOSIVE PRODUCTS.  
 HYDROGEN PEROXIDE AND MERCURIC OXIDE: FORMS EXPLOSIVE COMPOUNDS.  
 HYDROGEN PEROXIDE AND THIOUREA: FORMS EXPLOSIVE COMPOUNDS.  
 HYDROGEN SELENIDE: IGNITION REACTION.  
 HYDROGEN SULFIDE: INCANDESCENT REACTION.  
 HYDROGEN TELLURIDE: IGNITION AND POSSIBLE EXPLOSIVE REACTION.  
 INDANE AND SULFURIC ACID: EXPLOSIVE REACTION.  
 ISOPRENE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 KETONES (ALICIC): VIOLENT REACTION.  
 LACTIC ACID + HYDROFLUORIC ACID: EXPLOSIVE REACTION.  
 LITHIUM: IGNITION REACTION.  
 LITHIUM SILICIDE: INCANDESCENT REACTION.  
 MAGNESIUM: EXPLOSIVE REACTION.  
 MAGNESIUM + 2-NITROANILINE: MAY IGNITE ON CONTACT.  
 MAGNESIUM PHOSPHIDE: INCANDESCENT REACTION.  
 MAGNESIUM SILICIDE: VIOLENT REACTION.  
 MAGNESIUM-TITANIUM ALLOY: FORMS SHOCK AND HEAT SENSITIVE MIXTURE.  
 MANGANESE (POWDERED): INCANDESCENCE AND POSSIBLE EXPLOSION.  
 MESTYL OXIDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 MESTYLENE: POSSIBLE EXPLOSIVE REACTION.  
 METALS: VIOLENT REACTION WITH EXPLOSION OR IGNITION.  
 METAL ACETYLIDES: VIOLENT OR EXPLOSIVE REACTION.  
 METAL CARBIDES: VIOLENT OR EXPLOSIVE REACTION.  
 METAL CYANIDES: EXPLOSIVE REACTIONS.  
 METAL FERRICYANIDE OR FERROCYANIDE: VIOLENT REACTION.  
 METAL SALICYLATES: FORMS EXPLOSIVE COMPOUNDS.  
 METAL THIOCYANATES: POSSIBLE EXPLOSION.  
 2-METHYLBENZIMIDAZOLE + SULFURIC ACID: POSSIBLE EXPLOSIVE REACTION.  
 4-METHYLCYCLOHEXANONE: EXPLOSIVE REACTION.  
 2-METHYL-5-ETHYLPYRIDINE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 METHYL THIOPHENE: IGNITION REACTION.  
 NEODYMIUM PHOSPHIDE: VIOLENT REACTION.  
 NICKEL TETRAPHOSPHIDE: IGNITION REACTION.  
 NITRO AROMATIC HYDROCARBONS: FORMS HIGHLY EXPLOSIVE PRODUCTS.  
 NITROBENZENE: EXPLOSIVE REACTION, ESPECIALLY IN THE PRESENCE OF WATER.  
 NITROMETHANE: EXPLOSIVE REACTION.  
 NITRONAPHTHALENE: EXPLOSION HAZARD.  
 NON-METAL OXIDES : EXPLOSIVE REACTION.  
 OLEUM: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.

ORGANIC MATERIALS: FIRE AND EXPLOSION HAZARD.  
 ORGANIC SUBSTANCES AND PERCHLORATES: POSSIBLE EXPLOSION.  
 ORGANIC SUBSTANCES AND SULFURIC ACID: POSSIBLE EXPLOSION.  
 PHENYL ACETYLENE + 1,1-DIMETHYLHYDRAZINE: VIOLENT REACTION.  
 PHENYL ORTHOPHOSPHORIC ACID DISODIUM SALT: FORMS EXPLOSIVE PRODUCTS.  
 PHOSPHINE + OXYGEN: SPONTANEOUS IGNITION.  
 PHOSPHONUM IODIDE: IGNITION REACTION.  
 PHOSPHORUS (VAPEUR): IGNITES WHEN HEATED.  
 PHOSPHORUS HALIDES: IGNITION REACTION.  
 PHOSPHORUS TETRAIODIDE: VIGOROUS REACTION.  
 PHOSPHORUS TRICHLORIDE: EXPLOSIVE REACTION.  
 PHTHALIC ACID AND SULFURIC ACID: POSSIBLE EXPLOSIVE REACTION.  
 PHTHALIC ANHYDRIDE: EXOTHERMIC REACTION AND FORMS EXPLOSIVE PRODUCTS.  
 PICRATES: REACTS.  
 PLASTICS: MAY BE ATTACKED.  
 POLYALKENES: INTENSE REACTION.  
 POLYBROMOSILANES: EXPLOSIVE REACTION.  
 POLY(ETHYLENE OXIDE) DERIVATIVES: POSSIBLE EXPLOSION.  
 POLYPROPYLENE: TEMPERATURE AND PRESSURE INCREASE IN A CLOSED CONTAINER.  
 POLY(SILYLENE): IGNITION.  
 POLYURETHANE (FOAM): VIGOROUS REACTION.  
 POTASSIUM HYPOPHOSPHITE: EXPLOSIVE REACTION.  
 POTASSIUM PHOSPHINATE: EXPLODES ON EVAPORATION.  
 B-PROPIOLACTONE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 PROPIONEMONE + SULFURIC ACID: EXOTHERMIC REACTION ABOVE -5 C.  
 PROPYLENE GLYCOL + HYDROFLUORIC ACID + SILVER NITRATE: EXPLOSIVE MIXTURE.  
 PROPYLENE OXIDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 PYRIDINE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 PYROCATECHOL: IGNITES ON CONTACT.  
 REDUCING AGENTS: POSSIBLE EXPLOSIVE OR IGNITION REACTION.  
 RESORCINOL: POSSIBLE EXPLOSION.  
 RUBBER: VIGOROUS REACTION, POSSIBLE EXPLOSION.  
 SELENIUM: VIGOROUS REACTION.  
 SELENIUM HYDRIDE: IGNITION OR INCANDESCENT REACTION.  
 SELENIUM IODOPHOSPHIDE: EXPLOSIVE REACTION.  
 SILICON: VIOLENT REACTION.  
 SILICONE OIL: POSSIBLE EXPLOSION.  
 SILVER BUTEN-3-YNIDE: EXPLOSION.  
 SODIUM: SPONTANEOUS IGNITION.  
 SODIUM AZIDE: EXOTHERMIC REACTION.  
 SODIUM HYDROXIDE: TEMPERATURE AND PRESSURE INCREASE IN A CLOSED CONTAINER.  
 STIBINE: EXPLOSIVE REACTION.  
 SUCROSE (SOLID): VIGOROUS REACTION.  
 SULFAMIC ACID: VIOLENT REACTION WITH EVOLUTION OF TOXIC NITROUS OXIDE.  
 SULFIDES: REACTS.  
 SULFUR DIOXIDE: EXPLOSIVE REACTION.  
 SULFUR HALIDES: VIOLENT REACTION.  
 SULFURIC ACID + GLYCERIDES: EXPLOSIVE REACTION.  
 SULFURIC ACID + TEREPHTHALIC ACID: VIOLENT REACTION.  
 SURFACTANTS + PHOSPHORIC ACID: EXPLOSION HAZARD.  
 TERFENES: SPONTANEOUS IGNITION.  
 TETRACERANE: EXPLOSIVE REACTION.  
 TETRABRANE DECAHYDRIDE: EXPLOSIVE REACTION.  
 TETRAPHOSPHOROUS DIIODOTRISELENIIDE: EXPLOSIVE REACTION.  
 TETRAPHOSPHOROUS IODIDE: IGNITES ON CONTACT.  
 TETRAPHOSPHOROUS TETRAOXIDE TRISULFIDE: VIOLENT REACTION.  
 THIOALDEHYDES: VIOLENT REACTION.  
 THIOKETONES: VIOLENT REACTION.

INDUCENES: EXPLOSIVE REACTION.  
 TITANIUM: FORMS SHOCK-SENSITIVE COMPOUND.  
 TITANIUM ALLOYS: POSSIBLE EXPLOSIVE REACTION.  
 TITANIUM-MAGNESIUM ALLOY: POSSIBLE EXPLOSION ON IMPACT.  
 TOLUENE: VIOLENT REACTION.  
 TRICUMENE: IGNITION REACTION.  
 1,3,5-TRIAZOLYLHEXAHYDRO-1,3,5-TRIAZINE + TRIFLUOROBORIC ANHYDRIDE:  
 EXPLOSIVE REACTION.  
 TRIAZINE: VIOLENTLY EXPLOSIVE REACTION.  
 TRICADMIUM DIPHOSPHIDE: EXPLOSIVE REACTION.  
 TRIETHYLGALLIUM MONOETHYL ETHER COMPLEX: IGNITION REACTION.  
 TRIMETHYLTRIOXANE: INTENSE REACTION.  
 TRIS(IODOMERCURY)PHOSPHINE: VIOLENT DECOMPOSITION.  
 TRITHIOACETONE: EXPLOSIVE REACTION.  
 TURFENTINE: EXPLOSIVE MIXTURE.  
 UNSYMMETRICAL DIMETHYL HYDRAZINE: SPONTANEOUS IGNITION.  
 URANIUM: EXPLOSIVE REACTION.  
 URANIUM ALLOY: VIOLENT REACTION.  
 URANIUM DISULFIDE: VIOLENT REACTION.  
 URANIUM-NIODYMIUM ALLOYS: EXPLOSIVE REACTION.  
 VINYL ACETATE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 VINYLIDENE CHLORIDE: TEMPERATURE AND PRESSURE INCREASE IN CLOSED CONTAINER.  
 WOOD: POSSIBLE IGNITION.  
 X-EYLENE: INTENSE REACTION IN PRESENCE OF SULFURIC ACID.  
 ZINC: INCANDESCENT REACTION.  
 ZINC ETHOXIDE: POSSIBLE EXPLOSION.  
 ZIRCONIUM-URANIUM ALLOYS: EXPLOSIVE REACTION.

DECOMPOSITION:  
 THERMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF NITROGEN.

POLYMERIZATION:  
 HAZARDOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL  
 TEMPERATURES AND PRESSURES.

#### STORAGE AND DISPOSAL

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING  
 OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE  
 ENVIRONMENTAL PROTECTION AGENCY.

#### \*\*STORAGE\*\*

PROTECT AGAINST PHYSICAL DAMAGE. SEPARATE FROM METALLIC POWDERS, CARBIDES,  
 HYDROGEN SULFIDE, TURFENTINE, ORGANIC ACIDS, AND ALL COMBUSTIBLE, ORGANIC OR  
 OTHER READILY OXIDIZABLE MATERIALS. PROVIDE GOOD VENTILATION AND AVOID DIRECT  
 SUNLIGHT (NFPA 49, HAZARDOUS CHEMICALS DATA, 1975).

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

THRESHOLD PLANNING QUANTITY (TPQ):  
 THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 302 REQUIRES  
 THAT EACH FACILITY WHERE ANY EXTREMELY HAZARDOUS SUBSTANCE IS PRESENT IN A  
 QUANTITY EQUAL TO OR GREATER THAN THE TPQ ESTABLISHED FOR THAT SUBSTANCE  
 NOTIFY THE STATE EMERGENCY RESPONSE COMMISSION FOR THE STATE IN WHICH IT IS  
 LOCATED. SECTION 303 OF SARA REQUIRES THESE FACILITIES TO PARTICIPATE IN LOCAL

**\*\*DISPOSAL\*\***

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE. 40 CFR 262. EPA HAZARDOUS WASTE NUMBER D002.

1.0 POUND CERCLA SECTION 103 REPORTABLE QUANTITY.

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CONDITIONS TO AVOID

MAY IGNITE OTHER COMBUSTIBLE MATERIALS (WOOD, PAPER, OIL, ETC.). REACTS VIOLENTLY WITH WATER AND FUELS. FLAMMABLE. TOXIC GASES MAY ACCUMULATE IN TANKS AND HOPPER CARS. RUNOFF TO SEWER MAY CREATE FIRE OR EXPLOSION HAZARD.

CONSULT NFPA PUBLICATION 43A, STORAGE OF LIQUID AND SOLID OXIDIZING MATERIALS. FOR STORAGE REQUIREMENTS.

\*\*\*\*\*  
SPILL AND LEAK PROCEDURES

**SOIL SPILL:**  
DIG A HOLDING AREA SUCH AS A PIT, POND OR LAGOON TO CONTAIN SPILL AND DIKE SURFACE FLOW USING BARRIER OF SOIL, SANDBAGS, FOAMED POLYURETHANE OR FOAMED CONCRETE. ABSORB LIQUID MASS WITH FLY ASH OR CEMENT POWDER.

NEUTRALIZE SPILL WITH SLAKED LIME, SODIUM BICARBONATE OR CRUSHED LIMESTONE.

**AIR SPILL:**  
APPLY WATER SPRAY TO KNOCK DOWN AND REDUCE VAPORS. KNOCK-DOWN WATER IS CORROSIVE AND TOXIC AND SHOULD BE DIKED FOR CONTAINMENT AND LATER DISPOSAL.

**WATER SPILL:**  
ADD SUITABLE AGENT TO NEUTRALIZE SPILLED MATERIAL TO PH-7.

**OCCUPATIONAL SPILL:**  
KEEP COMBUSTIBLES (WOOD, PAPER, OIL, ETC.) AWAY FROM SPILLED MATERIAL. DO NOT TOUCH SPILLED MATERIAL. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. DO NOT GET WATER INSIDE CONTAINER. FOR SMALL SPILLS, FLUSH AREA WITH FLOODING AMOUNTS OF WATER. FOR LARGER SPILLS, DIKE FAR AHEAD OF SPILL FOR LATER DISPOSAL. KEEP UNNECESSARY PEOPLE AWAY. ISOLATE HAZARD AREA AND DENY ENTRY. VENTILATE CLOSED SPACES BEFORE ENTERING.

**REPORTABLE QUANTITY (RQ): 1000 POUNDS**  
THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-8802 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.6).

PROTECTIVE EQUIPMENT

VENTILATION:  
 PROVIDE LOCAL EXHAUST OR PROCESS ENCLOSURE VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS.

RESPIRATOR:  
 THE FOLLOWING RESPIRATORS AND MAXIMUM USE CONCENTRATIONS ARE RECOMMENDED BY THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, NIOSH POCKET GUIDE TO CHEMICAL HAZARDS; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29CFR1910 SUBPART Z.  
 THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (MSHA).

NITRIC ACID:

125 MG/M3- ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS-FLOW MODE.

250 MG/M3- ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE  
 ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.  
 ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE OR FRONT-OR BACK-MOUNTED CANISTER PROVIDING PROTECTION AGAINST NITRIC ACID.  
 ANY CHEMICAL CARTRIDGE RESPIRATOR WITH A FULL FACEPIECE AND CARTRIDGE(S) PROVIDING PROTECTION AGAINST NITRIC ACID.

ESCAPE- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE OR FRONT-OR BACK-MOUNTED CANISTER PROVIDING PROTECTION AGAINST NITRIC ACID.  
 ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

NOTE: ONLY NON-OXIDIZABLE SORBENTS ARE ALLOWED (NOT CHARCOAL).

FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:

SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE.

SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE AND OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

CLOTHING:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT ANY POSSIBILITY OF SKIN CONTACT WITH THIS SUBSTANCE.

GLOVES:

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS SUBSTANCE.

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES AND A FACESHIELD TO PREVENT CONTACT WITH THIS SUBSTANCE.

EMERGENCY WASH FACILITIES:

WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES AND/OR SKIN MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN AND QUICK DRENCH SHOWER WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

AUTHORIZED - FISHER SCIENTIFIC, INC.  
CREATION DATE: 12/04/84 REVISION DATE: 03/06/89

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\*\*\*ACETONE\*\*  
 \*\*\*ACETONE\*\*  
 \*\*\*ACETONE\*\*

MATERIAL SAFETY DATA SHEET

FISHER SCIENTIFIC  
 CHEMICAL DIVISION  
 1 REAGENT LANE  
 FAIR LAWN NJ 07410  
 (201) 796-7100

EMERGENCY NUMBER: (201) 796-7100  
 CHEMTREC ASSISTANCE: (800) 424-9300

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SUBSTANCE IDENTIFICATION

CAS-NUMBER 67-64-1

SUBSTANCE: \*\*\*ACETONE\*\*

TRADE NAMES/SYNONYMS:

DIMETHYLFORMALDEHYDE; DIMETHYLKETAL; DIMETHYL KETONE; BETA-KETOPROPANE;  
 PROPANONE; 2-PROPANONE; PYROACETIC ETHER; B-KETOPROPANE; ROCA 0002;  
 SICG 4708105; UN 1090; A-949; A-40; A-20; A-19; A-945; A-18;  
 A-18-S; A-18-SK; A-11; A-11-S; A-16-P; A-16-S; C3H6O;

CHEMICAL FAMILY:  
 KETONE, ALIPHATIC

MOLECULAR FORMULA: C-H3-C-O-C-H3

MOLECULAR WEIGHT: 58.08

CERCLA RATINGS (SCALE 0-3): HEALTH=1 FIRE=3 REACTIVITY=0 PERSISTENCE=0

RCRA RATINGS (SCALE 0-4): HEALTH=1 FIRE=3 REACTIVITY=0

COMPONENTS AND CONTAMINANTS

COMPONENT: ACETONE PERCENT: 100

OTHER CONTAMINANTS: NONE

EXPOSURE LIMITS:

ACETONE:

750 PPM (1780 MG/M3) OSHA TWA; 1000 PPM (2375 MG/M3) OSHA STEL  
 750 PPM (1780 MG/M3) ACGIH TWA; 1000 PPM (2375 MG/M3) ACGIH STEL  
 750 PPM (550 MG/M3) NIOSH RECOMMENDED 10 HOUR TWA

5000 POUNDS CERCLA SECTION 103 REPORTABLE QUANTITY  
 SUBJECT TO SARA SECTION 313 ANNUAL TOXIC CHEMICAL RELEASE REPORTING

PHYSICAL DATA

DESCRIPTION: CLEAR, COLORLESS, VOLATILE LIQUID WITH A CHARACTERISTIC

CHM 001 0576

CRISTALLINE, FRAGMENT, MINT-LIKE ODOR AND PUNGENT, SWEETISH TASTE.

BOILING POINT: 133 F (56 C) MELTING POINT: -139 F (-95 C)

SPECIFIC GRAVITY: 0.7899 VOLATILITY: 100%

VAPOR PRESSURE: 180 MMHG @ 20 C EVAPORATION RATE: (BUTYL ACETATE-L) 14.4

HEAVIEST IN SOLUTION SOLUBILITY IN WATER: VERY SOLUBLE

ODOR THRESHOLD: 20 PPM VAPOR DENSITY: 2.0

OTHER SOLUBILITY: SOLUBLE IN ETHANOL, ETHER, CHLOROFORM, BENZENE, MOST  
OTHER DIETHYLENEAMIDES

#### FIRE AND EXPLOSION DATA

FIRE AND EXPLOSION HAZARD:  
DANGEROUS FIRE HAZARD WHEN EXPOSED TO HEAT OR FLAME.

VAPORS ARE HEAVIER THAN AIR AND MAY TRAVEL A CONSIDERABLE DISTANCE TO A SOURCE  
OF IGNITION AND FLASH BACK.

VAPOR-AIR MIXTURES ARE EXPLOSIVE.

FLASH POINT: -4 F (-20 C) (CC) UPPER EXPLOSIVE LIMIT: 13%

LOWER EXPLOSIVE LIMIT: 2.5% AUTOIGNITION TEMP.: 849 F (465 C)

FLAMMABILITY CLASS(OSHA): II

FIREFIGHTING MEDIA:  
DRY CHEMICAL, CARBON DIOXIDE, HALON, WATER SPRAY OR ALCOHOL FOAM  
(1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

FOR LARGER FIRES, USE WATER SPRAY, FOG OR ALCOHOL FOAM  
(1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4).

FIREFIGHTING:  
MOVE CONTAINER FROM FIRE AREA IF POSSIBLE. COOL FIRE-EXPOSED CONTAINERS WITH  
WATER FROM SIDE UNTIL WELL AFTER FIRE IS OUT. STAY AWAY FROM STORAGE TANK  
ENDS. FOR MASSIVE FIRE IN STORAGE AREA, USE UNMANNED HOSE HOLDER OR MONITOR  
NOZZLES, ELSE WITHDRAW FROM AREA AND LET FIRE BURN. WITHDRAW IMMEDIATELY IN  
CASE OF RISING SOUND FROM VENTING SAFETY DEVICE OR ANY DISCOLORATION OF  
STORAGE TANK DUE TO FIRE (1987 EMERGENCY RESPONSE GUIDEBOOK, DOT P 5800.4,  
GUIDE PAGE 26).

EXTINGUISH ONLY IF FLOW CAN BE STOPPED. USE FLOODING AMOUNTS OF WATER AS A  
FOG; SOLID STREAMS MAY BE INEFFECTIVE. COOL CONTAINERS WITH FLOODING AMOUNTS  
OF WATER FROM AS FAR A DISTANCE AS POSSIBLE. AVOID BREATHING VAPORS; KEEP  
UPWIND. IF FIRE IS UNCONTROLLABLE OR CONTAINERS ARE EXPOSED TO DIRECT FLAME,  
EVACUATE TO A RADIUS OF 1500 FEET. CONSIDER EVACUATION OF DOWNWIND AREA IF  
MATERIAL IS LEAKING.

WATER MAY BE INEFFECTIVE (NFPA FIRE PROTECTION GUIDE ON HAZARDOUS MATERIALS,  
EIGHTH EDITION).

ALCOHOL FROM 2009 FIRE PROTECTION GUIDE ON HAZARDOUS MATERIAL, EIGHTH EDITION

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TRANSPORTATION DATA

DEPARTMENT OF TRANSPORTATION HAZARD CLASSIFICATION 49CFR172.101:  
FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION LABELING REQUIREMENTS 49CFR172.101 AND SUBPART E:  
FLAMMABLE LIQUID

DEPARTMENT OF TRANSPORTATION PACKAGING REQUIREMENTS: 49CFR173.119  
EXCEPTIONS: 49CFR173.119

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TOXICITY

ACETONE:

500 PPM EYE-HUMAN IRRITATION; 395 MG OPEN SKIN-RABBIT MILD IRRITATION; 3950 UG EYE-RABBIT SEVERE IRRITATION; 20 MG/24 HOURS EYE-RABBIT MODERATE IRRITATION; 500 MG/24 HOURS SKIN-RABBIT MILD IRRITATION; 500 PPM INHALATION-HUMAN TCLO; 12000 PPM/4 HOURS INHALATION-MAN TCLO; 10 MG/M<sup>3</sup>/6 HOURS INHALATION-MAN TCLO; 440 UG/M<sup>3</sup>/4 MINUTES INHALATION-MAN TCLO; 2857 MG/KG ORAL-MAN TCLO; 1159 MG/KG UNREPORTED-MAN LDLO; 5800 MG/KG ORAL-RAT LD50; 8 GM/KG ORAL-DOG LDLO; 3000 MG/KG ORAL-MOUSE LD50; 5340 MG/KG ORAL-RABBIT LD50; 20 GM/KG SKIN-RABBIT LD50; 110 GM/M<sup>3</sup>/1 HOUR INHALATION-MOUSE LCLO; 1297 MG/KG INTRAPERITONEAL-MOUSE LD50; 8 GM/KG INTRAPERITONEAL-DOG LDLO; 500 MG/KG INTRAPERITONEAL-RAT LDLO; 1576 MG/KG INTRAVENOUS-RABBIT LDLO; 5500 MG/KG INTRAVENOUS-RAT LD50; 4 GM/KG INTRAVENOUS-MOUSE LDLO; 5000 MG/KG SUBCUTANEOUS-GUINEA PIG LDLO; 5 GM/KG SUBCUTANEOUS-DOG LDLO; MUTAGENIC DATA (RTECS); REPRODUCTIVE EFFECTS DATA (RTECS);

CARCINOGEN STATUS: NONE.

ACETONE IS A SKIN, EYE AND MUCOUS MEMBRANE IRRITANT AND CENTRAL NERVOUS SYSTEM DEPRESSANT. THE USE OF ALCOHOLIC BEVERAGES MAY ENHANCE THE TOXIC EFFECTS. PERSONS WITH CHRONIC RESPIRATORY OR SKIN DISEASES MAY BE AT AN INCREASED RISK FROM EXPOSURE.

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HEALTH EFFECTS AND FIRST AID

INHALATION:

ACETONE:

IRRITANT/NARCOTIC. 20,000 PPM IMMEDIATELY DANGEROUS TO LIFE OR HEALTH.

ACUTE EXPOSURE- VAPOR CONCENTRATIONS AROUND 1000 PPM MAY CAUSE SLIGHT TRANSIENT IRRITATION OF THE UPPER RESPIRATORY TRACT. EXPOSURE TO 12,000 PPM HAS CAUSED THROAT IRRITATION AND CENTRAL NERVOUS SYSTEM DEPRESSION WITH WEAKNESS OF THE LEGS, HEADACHE, DIZZINESS, DROWSINESS, NAUSEA AND A GENERAL FEELING OF MALAISE. OTHER POSSIBLE EFFECTS FROM EXPOSURE TO HIGH CONCENTRATIONS INCLUDE DRYNESS OF THE MOUTH AND THROAT, INCOORDINATION OF MOTION AND SPEECH, RESTLESSNESS, ANOREXIA, VOMITING, SOMETIMES FOLLOWED BY HEMATEMESIS, HYPOTHERMIA, DYSPNEA, SLOW, IRREGULAR RESPIRATION, SLOW, WEAK PULSE, PROGRESSIVE COLLAPSE WITH STUPOR, AND IN SEVERE CASES, COMA. LIVER DAMAGE MAY BE INDICATED BY HIGH UROBILIN LEVELS AND JAUNDICE. KIDNEY DAMAGE MAY BE INDICATED BY ALBUMIN AND RED AND WHITE BLOOD CELLS IN THE URINE. BLOOD GLUCOSE LEVELS MAY BE AFFECTED AND FATAL KETOSIS IS POSSIBLE.

CHRONIC EXPOSURE- WORKERS EXPOSED TO 500 PPM/6 HOURS/6 DAYS EXPERIENCED MUCOUS MEMBRANE IRRITATION, AN UNPLEASANT SMELL, HEAVY EYES, OVERNIGHT

NEURALGIC, AND GENERAL WEAKNESS ACCOMPANIED BY HEMATOLOGIC CHANGES. RECOVERY OCCURRED IN SEVERAL DAYS. WORKERS EXPOSED TO 1000 PPM FOR 5 HOURS/DAY FOR 7-15 YEARS REPORTED CHRONIC INFLAMMATION OF THE RESPIRATORY TRACT, STOMACH AND DUODENUM, DIZZINESS, LOSS OF STRENGTH, AND ASTHMA. BRONCHITIS, VERTIGO, SENSATION OF HEAT, AND COUGHING HAVE ALSO BEEN REPORTED FROM CHRONIC EXPOSURE TO LOW CONCENTRATIONS. ANIMAL STUDIES SHOW ADVERSE EFFECTS ON FERTILITY WHEN FEMALES WERE EXPOSED CHRONICALLY DURING PREGNANCY.

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

#### SKIN CONTACT:

ACETONE:  
IRRITANT.

ACUTE EXPOSURE- CONTACT WITH THE LIQUID CAUSED MILD IRRITATION IN RABBITS. CELLULAR DAMAGE TO THE OUTER LAYERS OF THE EPITHELIUM WITH MILD EDEMA AND HYPEREMIA HAS BEEN DEMONSTRATED IN HUMANS, BUT WAS READILY REVERSIBLE. SMALL AMOUNTS MAY BE ABSORBED THROUGH INTACT SKIN.  
CHRONIC EXPOSURE- REPEATED OR PROLONGED EXPOSURE MAY CAUSE DERMATITIS WITH DRYING, CRACKING, AND ERYTHEMA DUE TO THE DEFATTING ACTION. THE AMOUNT ABSORBED THROUGH THE SKIN INCREASES DIRECTLY WITH THE FREQUENCY AND EXTENT OF THE EXPOSURE. 2 OF 3 GUINEA PIGS EXPOSED BY SKIN CONTACT FOR 3 WEEKS DEVELOPED CATARACTS BY THE END OF THREE MONTHS.

FIRST AID- REMOVE CONTAMINATED CLOTHING AND SHOES IMMEDIATELY. WASH AFFECTED AREA WITH SOAP OR MILD DETERGENT AND LARGE AMOUNTS OF WATER UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

#### EYE CONTACT:

ACETONE:  
IRRITANT.

ACUTE EXPOSURE- IN HUMANS, VAPORS PRODUCE ONLY SLIGHT IRRITATION WHEN THE CONCENTRATION IS AT OR BELOW 1000 PPM. HOWEVER, HIGH VAPOR CONCENTRATIONS HAVE CAUSED CORNEAL EPITHELIAL AND CONJUNCTIVAL INJURY IN ANIMALS. LIQUID SPILLED IN HUMAN EYES CAUSES AN IMMEDIATE STINGING SENSATION AND, IF WASHED PROMPTLY, DAMAGE ONLY TO THE CORNEAL EPITHELIUM CHARACTERIZED BY MICROSCOPIC GRAY DOTS AND A FOREIGN BODY SENSATION, WHICH HEALS COMPLETELY IN 1-2 DAYS.  
CHRONIC EXPOSURE- PROLONGED OR REPEATED EXPOSURE TO THE VAPORS MAY CAUSE IRRITATION OR CONJUNCTIVITIS.

FIRST AID- WASH EYES IMMEDIATELY WITH LARGE AMOUNTS OF WATER OR NORMAL SALINE, OCCASIONALLY LIFTING UPPER AND LOWER LIDS, UNTIL NO EVIDENCE OF CHEMICAL REMAINS (APPROXIMATELY 15-20 MINUTES). GET MEDICAL ATTENTION IMMEDIATELY.

#### INGESTION:

ACETONE:  
NARCOTIC.

ACUTE EXPOSURE- MAY CAUSE A FRUITY ODOR OF THE BREATH AND MUCOUS MEMBRANE AND GASTROENTERIC IRRITATION. IN ACUTE CASES, A LATENT PERIOD MAY BE FOLLOWED BY RESTLESSNESS AND VOMITING PROCEEDING TO HEMATEMESIS AND PROGRESSIVE COLLAPSE WITH STUPOR. HEPATORENAL LESIONS HAVE BEEN REPORTED. THE BLOOD GLUCOSE LEVEL MAY BE AFFECTED AND KELOSIIS MAY BE FATAL. 10-20 MILLILITERS HAVE BEEN TOLERATED WITHOUT ILL EFFECTS. 200 MILLILITERS HAVE

CAUSED SUDOR WITHIN A HALF HOUR, FLUSHED CHEEKS, SHALLOW RESPIRATION, AND COMA WHICH LASTED FOR 12 HOURS. RENAL GLUCOSURIA PERSISTED FOR 5 MONTHS. CHRONIC PNEUMONIA- NO DATA AVAILABLE.

**FIRST AID:** IF THE PERSON IS CONSCIOUS AND NOT CONVULSING, INDUCE EMESIS BY GIVING SYRUP OF IPECAC FOLLOWED BY WATER. (IF VOMITING OCCURS KEEP THE HEAD BELOW THE KNEES TO PREVENT ASPIRATION). REPEAT IN 20 MINUTES IF NOT EFFECTIVE INITIALLY. GIVE ACTIVATED CHARCOAL. IN PATIENTS WITH DEPRESSED RESPIRATION OR IF EMESIS IS NOT PRODUCED, PERFORM GASTRIC LAVAGE CAUTIOUSLY (BRETSCHN. HANDBOOK OF POISONING, 12TH ED.). TREAT SYMPTOMATICALLY AND SUPPORTIVELY. GASTRIC LAVAGE SHOULD BE PERFORMED BY QUALIFIED MEDICAL PERSONNEL. GET MEDICAL ATTENTION IMMEDIATELY.

**ANTIDOTE:**

NO SPECIFIC ANTIDOTE. TREAT SYMPTOMATICALLY AND SUPPORTIVELY.

**REACTIVITY****REACTIVITY:**

STABLE UNDER NORMAL TEMPERATURES AND PRESSURES.

**INCOMPATIBILITIES:****ACETONE:**

ACIDS: INCOMPATIBLE.  
 AMINES (ALIPHATIC): INCOMPATIBLE.  
 BROMINE: VIOLENT REACTION WITH EXCESS AMOUNTS OF BROMINE.  
 BROMINE TRIFLUORIDE: EXPLOSION ON CONTACT.  
 BROMOFORM: VIOLENT REACTION IN PRESENCE OF BASES (E.G. POTASSIUM HYDROXIDE).  
 CHLOROFORM: VIOLENT REACTION IN PRESENCE OF A BASE.  
 CHROMIUM TRIOXIDE: IGNITION ON CONTACT AT AMBIENT TEMPERATURE.  
 CHROMYL CHLORIDE: INCANDESCENT REACTION.  
 DIOXYGEN DIFLUORIDE + SOLID CARBON DIOXIDE: EXPLOSION AT -78 C.  
 HEXACHLOROMELAMINE: POSSIBLE EXPLOSION.  
 HYDROGEN PEROXIDE: EXPLOSION.  
 NITRIC ACID: IGNITION.  
 NITRIC + ACETIC ACID MIXTURE: POSSIBLE EXPLOSION.  
 NITRIC + SULFURIC ACID MIXTURE: VIOLENT OXIDATION.  
 NITROSYL CHLORIDE: EXPLOSIVE REACTION.  
 NITROSYL PERCHLORATE: IGNITION AND EXPLOSION.  
 NITRYL PERCHLORATE: IGNITION AND EXPLOSION.  
 OXIDIZERS (STRONG): FIRE AND EXPLOSION HAZARD.  
 PERMANGANOUS SULFURIC ACID: EXPLOSION.  
 PLASTICS: INCOMPATIBLE.  
 PLATINUM + NITROSYL CHLORIDE: POSSIBLE EXPLOSION.  
 POTASSIUM-TERT-BUTOXIDE: IGNITION.  
 RAYON: INCOMPATIBLE.  
 SODIUM HYPOBROMITE: EXPLOSION.  
 SODIUM HYPOIODITE: POSSIBLE EXPLOSION.  
 SULFUR DICHLORIDE: VIOLENT REACTION.  
 SULFURIC ACID AND POTASSIUM BICHROMATE: IGNITION.  
 THIODIGLYCOL + HYDROGEN PEROXIDE: POSSIBLE EXPLOSION.  
 THIOURIAZYL PERCHLORATE: POSSIBLE EXPLOSION.  
 1,1,1-TRICHLOROETHANE: EXOTHERMIC CONDENSATION BY A BASIC CATALYST.  
 TRICHLOROMELAMINE: POSSIBLE EXPLOSION.

SEE ALSO KETONES.

**KETONES:**

ACETALDEHYDE: VIOLENT CONDENSATION REACTION.  
NITRIC ACID + HYDROGEN PEROXIDE: FORMATION OF EXPLOSIVE PRODUCT.  
PERFLUOROIC ACID: VIOLENT DECOMPOSITION.

DECOMPOSITION:  
NORMAL DECOMPOSITION PRODUCTS MAY INCLUDE TOXIC OXIDES OF CARBON.

POLYMERIZATION:  
HETEROGENEOUS POLYMERIZATION HAS NOT BEEN REPORTED TO OCCUR UNDER NORMAL TEMPERATURES AND PRESSURES.

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**STORAGE AND DISPOSAL**

OBSERVE ALL FEDERAL, STATE AND LOCAL REGULATIONS WHEN STORING OR DISPOSING OF THIS SUBSTANCE. FOR ASSISTANCE, CONTACT THE DISTRICT DIRECTOR OF THE ENVIRONMENTAL PROTECTION AGENCY.

**\*\*STORAGE\*\***

STORE IN ACCORDANCE WITH 29 CFR 1910.106.

BONDING AND GROUNDING: SUBSTANCES WITH LOW ELECTROCONDUCTIVITY, WHICH MAY BE IGNITED BY ELECTROSTATIC SPARKS, SHOULD BE STORED IN CONTAINERS WHICH MEET THE BONDING AND GROUNDING GUIDELINES SPECIFIED IN OSHA 29-1983. RECOMMENDED PRACTICE ON STATIC ELECTRICITY.

STORE AWAY FROM INCOMPATIBLE SUBSTANCES.

**\*\*DISPOSAL\*\***

DISPOSAL MUST BE IN ACCORDANCE WITH STANDARDS APPLICABLE TO GENERATORS OF HAZARDOUS WASTE, 40CFR 262. EPA HAZARDOUS WASTE NUMBER U002.

\*\*\*\*\*  
**CONDITIONS TO AVOID**

AVOID CONTACT WITH HEAT, SPARKS, FLAMES, OR OTHER SOURCES OF IGNITION. VAPORS MAY BE EXPLOSIVE AND POISONOUS; DO NOT ALLOW UNNECESSARY PERSONNEL. DO NOT OVERHEAT CONTAINERS; CONTAINERS MAY VIOLENTLY EXPLODE AND TRAVEL A CONSIDERABLE DISTANCE IN HEAT OF FIRE.

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**SPILL AND LEAK PROCEDURES**

OCCUPATIONAL SPILL:  
SHUT OFF IGNITION SOURCES. STOP LEAK IF YOU CAN DO IT WITHOUT RISK. USE WATER SPRAY TO REDUCE VAPORS. FOR SMALL SPILLS, TAKE UP WITH SAND OR OTHER ABSORBENT MATERIAL AND PLACE INTO CONTAINERS FOR LATER DISPOSAL. FOR LARGER SPILLS, GET FAR AHEAD OF SPILL FOR LATER DISPOSAL. NO SMOKING, FLAMES OR FLARES IN HAZARD AREA! KEEP UNNECESSARY PEOPLE AWAY; ISOLATE HAZARD AREA AND DENY ENTRY.

REPORTABLE QUANTITY (RQ): 5000 POUNDS  
THE SUPERFUND AMENDMENTS AND REAUTHORIZATION ACT (SARA) SECTION 304 REQUIRES THAT A RELEASE EQUAL TO OR GREATER THAN THE REPORTABLE QUANTITY FOR THIS

SUBSTANCE BE IMMEDIATELY REPORTED TO THE LOCAL EMERGENCY PLANNING COMMITTEE AND THE STATE EMERGENCY RESPONSE COMMISSION (40 CFR 355.40). IF THE RELEASE OF THIS SUBSTANCE IS REPORTABLE UNDER CERCLA SECTION 103, THE NATIONAL RESPONSE CENTER MUST BE NOTIFIED IMMEDIATELY AT (800) 424-2002 OR (202) 426-2675 IN THE METROPOLITAN WASHINGTON, D.C. AREA (40 CFR 302.4).

-----  
**PROTECTIVE EQUIPMENT**

**VENTILATION:**

PROVIDE GENERAL DILUTION VENTILATION TO MEET PUBLISHED EXPOSURE LIMITS.

**RESPIRATOR:**

THE FOLLOWING RESPIRATORS AND MAXIMUM USE CONCENTRATIONS ARE RECOMMENDATIONS BY THE U.S. DEPARTMENT OF HEALTH AND HUMAN SERVICES, NIOSH POCHE GUIDE TO CHEMICAL HAZARDS; NIOSH CRITERIA DOCUMENTS OR BY THE U.S. DEPARTMENT OF LABOR, 29CFR1910 SUBPART Z.

THE SPECIFIC RESPIRATOR SELECTED MUST BE BASED ON CONTAMINATION LEVELS FOUND IN THE WORK PLACE, MUST NOT EXCEED THE WORKING LIMITS OF THE RESPIRATOR AND BE JOINTLY APPROVED BY THE NATIONAL INSTITUTE FOR OCCUPATIONAL SAFETY AND HEALTH AND THE MINE SAFETY AND HEALTH ADMINISTRATION (NIOSH-MSHA).

1000 PPM- ANY CHEMICAL CARTRIDGE RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S).  
 ANY POWERED AIR-PURIFYING RESPIRATOR WITH ORGANIC VAPOR CARTRIDGE(S).  
 ANY SUPPLIED-AIR RESPIRATOR.  
 ANY SELF-CONTAINED BREATHING APPARATUS.

4250 PPM- ANY SUPPLIED-AIR RESPIRATOR OPERATED IN A CONTINUOUS FLOW MODE.

12,500 PPM- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE OR FRONT- OR BACK-MOUNTED ORGANIC VAPOR CANISTER.  
 ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE.  
 ANY SELF-CONTAINED BREATHING APPARATUS WITH A FULL FACEPIECE.

20,000 PPM- ANY SUPPLIED-AIR RESPIRATOR WITH A FULL FACEPIECE AND OPERATED IN A PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

ESCAPE- ANY AIR-PURIFYING FULL FACEPIECE RESPIRATOR (GAS MASK) WITH A CHIN-STYLE OR FRONT- OR BACK-MOUNTED ORGANIC VAPOR CANISTER.  
 ANY APPROPRIATE ESCAPE-TYPE SELF-CONTAINED BREATHING APPARATUS.

**FOR FIREFIGHTING AND OTHER IMMEDIATELY DANGEROUS TO LIFE OR HEALTH CONDITIONS:**

SELF-CONTAINED BREATHING APPARATUS WITH FULL FACEPIECE OPERATED IN PRESSURE DEMAND OR OTHER POSITIVE PRESSURE MODE.

SUPPLIED-AIR RESPIRATOR WITH FULL FACEPIECE AND OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE IN COMBINATION WITH AN AUXILIARY SELF-CONTAINED BREATHING APPARATUS OPERATED IN PRESSURE-DEMAND OR OTHER POSITIVE PRESSURE MODE.

**CLOTHING:**

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE (IMPERVIOUS) CLOTHING AND EQUIPMENT TO PREVENT REPEATED OR PROLONGED SKIN CONTACT WITH THIS SUBSTANCE.

**GLOVES:**

EMPLOYEE MUST WEAR APPROPRIATE PROTECTIVE GLOVES TO PREVENT CONTACT WITH THIS

SUBSTANCE:

EYE PROTECTION:

EMPLOYEE MUST WEAR SPLASH-PROOF OR DUST-RESISTANT SAFETY GOGGLES TO PREVENT EYE CONTACT WITH THIS SUBSTANCE.

EMERGENCY EYE WASH: WHERE THERE IS ANY POSSIBILITY THAT AN EMPLOYEE'S EYES MAY BE EXPOSED TO THIS SUBSTANCE, THE EMPLOYER SHOULD PROVIDE AN EYE WASH FOUNTAIN WITHIN THE IMMEDIATE WORK AREA FOR EMERGENCY USE.

AUTHORIZED - FISHER SCIENTIFIC, INC.  
CREATION DATE: 09/06/84 REVISION DATE: 10/13/89

-ADDITIONAL INFORMATION-

THIS INFORMATION 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.



**APPENDIX C**  
**COLD STRESS TYPES**  
**AND**  
**SYMPTOMS OF HYPOTHERMIA**

CHM 001 0584

## COLD STRESS

### Types

Systemic hypothermia  
Local hypothermia

### Consider

Air temperature  
Wind speed  
Equivalent chill temperature

### Warning Signs

Systemic - maximum severe shivering  
Local - pain in the extremities

## HYPOTHERMIA: Prevention/Recommendations

Loose fitting, dry clothing, outer windbreak garment  
High calorie diet  
Avoid bare metal  
Avoid exposure to moisture  
Adequate work/rest periods  
Avoid/limit risk factors  
Availability of enclosed, heated environment  
Availability of dry changes of clothing  
conduct body temperature monitoring  
Availability of hypothermia packs  
Fluid replacement (warm drinks soup)  
Buddy system

## LOCAL HYPOTHERMIA

### Types

Frost nip  
superficial frostbite  
Deep frostbite  
Trench foot - non freezing  
Immersion foot - non freezing

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## Risk Factors

Duration of exposure  
Ambient temperature  
Wind  
Contact with cold metal or moisture  
Clothing  
Race  
Acclimatization  
Previous Cold injury  
Host factors (medications, smoking)

## Recognition

Frostnip  
whitened area of skin  
slightly burning or painful

Superficial frostbite  
waxy, white skin; firm sensation, some resiliency  
feels warm to victim without plan

Deep frostbite  
skin cold, numb, pale, firm or hard

## Treatment

Frostnip  
simple rewarming

Frostbite  
Transport to medical facility rather than attempting to administer care as thawing and refreezing can cause severe damage

Institute basic measures as follows:

### DO

Prevent further heat loss and protect from further damage (cover); get victim to protected environment.

### DO NOT

allow victim to smoke or drink alcohol, rub skin with anything, thaw with warm water or dry heat; walk on thawed foot/use thawed hand; break any blisters, apply heat.

**DO NOT**

allow victim to smoke or drink alcohol, rub skin with anything, thaw with warm water or dry heat; walk on thawed foot/use thawed hand; break any blisters, apply heat.

**SYSTEMIC HYPOTHERMIA**

**Risk Factors**

- Medications/drugs
- Alcohol
- Wetting
- Wind
- Medical conditions (circulatory problems)
- Age

**Recognition**

- Mild hypothermia
- Subtle behavioral changes

- decreased worker efficiency
- decreased level of communication
- forgetfulness
- repetitive behavior
- poor motor skills
- poor judgement
- distraction
- denial

**Most thermoregulatory mechanisms intact**

- shivering
- goose flesh
- peripheral vasoconstriction (cold pale skin)
- person feels cold

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## Moderate hypothermia

conscious  
incapable of functioning effectively  
grossly disoriented mental function  
behavioral changes

stupor  
disorientation  
hallucinations  
inappropriate affect  
bizarre behavior

## Some lost of thermoregulatory mechanisms

shivering absent  
goose flesh disappears  
slowed heart rate  
dilated peripheral blood vessel  
diminished feeling of cold

## Treatment

All stages

rewarming

passive - conservation of body heat  
active - applying heat

CHM 001 0588

**APPENDIX D**  
**OSHA POSTER**

CHM 001 0589

# JOB SAFETY & HEALTH PROTECTION

The Occupational Safety and Health Act of 1970 provides job safety and health protection for workers by promoting safe and healthful working conditions throughout the Nation. Provisions of the Act include the following:

## Employers

All employers must furnish to employees employment and a place of employment free from recognized hazards that are causing or are likely to cause death or serious harm to employees. Employers must comply with occupational safety and health standards issued under the Act.

## Employees

Employees must comply with all occupational safety and health standards, rules, regulations and orders issued under the Act that apply to their own actions and conduct on the job.

The Occupational Safety and Health Administration (OSHA) of the U.S. Department of Labor has the primary responsibility for administering the Act. OSHA issues occupational safety and health standards, and its Compliance Safety and Health Officers conduct jobsite inspections to help ensure compliance with the Act.

## Inspection

The Act requires that a representative of the employer and a representative authorized by the employees be given an opportunity to accompany the OSHA inspector for the purpose of aiding the inspection.

Where there is no authorized employee representative, the OSHA Compliance Officer must consult with a reasonable number of employees concerning safety and health conditions in the workplace.

## Complaint

Employees or their representatives have the right to file a complaint with the nearest OSHA office requesting an inspection if they believe unsafe or unhealthful conditions exist in their workplace. OSHA will withhold, on request, names of employees complaining.

The Act provides that employees may not be discharged or discriminated against in any way for filing safety and health complaints or for otherwise exercising their rights under the Act.

Employees who believe they have been discriminated against may file a complaint with their nearest OSHA office within 30 days of the alleged discriminatory action.

## Citation

If upon inspection OSHA believes an employer has violated the Act, a citation alleging such violations will be issued to the employer. Each citation will specify a time period within which the alleged violation must be corrected.

The OSHA citation must be prominently displayed at or near the place of alleged violation for three days, or until it is corrected, whichever is later, to warn employees of dangers that may exist there.

## Proposed Penalty

The Act provides for mandatory penalties against employers of up to \$1,000 for each serious violation and for optional penalties of up to \$1,000 for each nonserious violation. Penalties of up to \$1,000 per day may be proposed for failure to correct violations within the proposed time period. Also, any employer who willfully or repeatedly violates the Act may be assessed penalties of up to \$10,000 for each such violation.

There are also provisions for criminal penalties. Any willful violation resulting in death of an employee, upon conviction, is punishable by a fine of up to \$250,000 (or \$500,000 if the employer is a corporation), or by imprisonment for up to six months, or both. A second conviction of an employer doubles the possible term of imprisonment.

## Voluntary Activity

While providing penalties for violations, the Act also encourages efforts by labor and management, before an OSHA inspection, to reduce workplace hazards voluntarily and to develop and improve safety and health programs in all workplaces and industries. OSHA's Voluntary Protection Programs recognize outstanding efforts of this nature.

OSHA has published Safety and Health Program Management Guidelines to assist employers in establishing or perfecting programs to prevent or control employee exposure to workplace hazards. There are many public and private organizations that can provide information and assistance in this effort, if requested. Also, your local OSHA office can provide considerable help and advice on solving safety and health problems or can refer you to other sources for help such as training.

## Consultation

Free assistance in identifying and correcting hazards and in improving safety and health management is available to employers, without citation or penalty, through OSHA-supported programs in each State. These programs are usually administered by the State Labor or Health department or a State university.

## Posting Instructions

Employers in States operating OSHA approved State Plans should obtain and post the State's equivalent poster.

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Under provisions of Title 29, Code of Federal Regulations, Part 1903.2(a)(1) employers must post this notice (or facsimile) in a conspicuous place where notices to employees are customarily posted.

## More Information

Additional information and copies of the Act, specific OSHA safety and health standards and other applicable regulations may be obtained from your employer or from the nearest OSHA Regional Office in the following locations:

Atlanta	(404) 347-3573
Boston	(617) 565-7184
Chicago	(312) 353-2220
Dallas	(214) 787-4731
Denver	(303) 844-3061
Kansas	(816) 436-5881
New York	(212) 337-2325
Philadelphia	(215) 566-1201
San Francisco	(415) 885-8872
Seattle	(206) 442-8830

*Elizabeth Dole*

Elizabeth Dole, Secretary of Labor

**U.S. Department of Labor**

Occupational Safety and Health Administration

Washington, D.C.  
1988 (Revised)  
OSHA 2203



**APPENDIX E**  
**INCIDENT REPORT**



INCIDENT REPORT

SITE: \_\_\_\_\_

SITE LOCATION: \_\_\_\_\_

INCIDENT LOCATION: \_\_\_\_\_

DATE AND TIME OF INCIDENT \_\_\_\_\_

INJURY/ILLNESS

(If additional people are involved attach sheets)

Name of Injured: \_\_\_\_\_

Address: \_\_\_\_\_

SSN: \_\_\_\_\_ Age: \_\_\_\_\_ Sex: \_\_\_\_\_

Years of Service: \_\_\_\_\_ Time on Present Job: \_\_\_\_\_

Title/Classification: \_\_\_\_\_

Severity of Injury or Illness: \_\_\_\_\_ Non-disabling  
\_\_\_\_\_ Disabling \_\_\_\_\_ Medical Treatment  
\_\_\_\_\_ Fatality \_\_\_\_\_ First Aid

Estimate Number of Days Away From Job: \_\_\_\_\_

Describe Injury or Illness: (include part of body & degree of disability):  
\_\_\_\_\_

INCIDENT CATEGORY (check all that apply)

- |  |  |   |
|--|--|---|
| <input type="checkbox"/> Injury        | <input type="checkbox"/> Illness           | <input type="checkbox"/> Property Damage    |
| <input type="checkbox"/> Near Miss     | <input type="checkbox"/> Fire              | <input type="checkbox"/> Chemical Exposure  |
| <input type="checkbox"/> Motor Vehicle | <input type="checkbox"/> On site equipment | <input type="checkbox"/> Electrical         |
| <input type="checkbox"/> Mechanical    | <input type="checkbox"/> Caught In         | <input type="checkbox"/> Slip/Trip/Fall     |
| <input type="checkbox"/> Struck By     | <input type="checkbox"/> Other             | <input type="checkbox"/> Radiation Exposure |

Classification of Injury:

- |   |  |   |
|---|--|---|
| <input type="checkbox"/> Fractures                | <input type="checkbox"/> Dermal Reaction | <input type="checkbox"/> Toxic Exposure       |
| <input type="checkbox"/> Dislocations             | <input type="checkbox"/> Heat/Electrical | <input type="checkbox"/> Cold Exposure        |
| <input type="checkbox"/> Sprains                  | <input type="checkbox"/> Burns           | <input type="checkbox"/> Heat Stress          |
| <input type="checkbox"/> Abrasions                | <input type="checkbox"/> Chemical Burns  | <input type="checkbox"/> Concussion           |
| <input type="checkbox"/> Lacerations              | <input type="checkbox"/> Radiation Burns | <input type="checkbox"/> Bites                |
| <input type="checkbox"/> Punctures                | <input type="checkbox"/> Bruises         | <input type="checkbox"/> Respiratory Reaction |
| <input type="checkbox"/> Faint/Dizziness/Nauseous |  |   |

Number of Days Hospitalized \_\_\_\_\_ Outpatient \_\_\_\_\_

Date Medical Care was Received: \_\_\_\_\_

Name of Medical Care Provider: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone No.: \_\_\_\_\_

Name, Address and Telephone No. of Personal Physician

Narrative Report of Incident:

Factors leading to or contributing to the incident, the incident occurrence, and actions following the incident. Append additional sheets of paper if necessary.)

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

WITNESSES TO INCIDENT

1. NAME \_\_\_\_\_ COMPANY \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
TELEPHONE NO. \_\_\_\_\_

2. NAME \_\_\_\_\_ COMPANY \_\_\_\_\_  
ADDRESS \_\_\_\_\_  
TELEPHONE NO. \_\_\_\_\_

PROPERTY DAMAGE

Description of Property Damaged and Estimated Cost:

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

INCIDENT ANALYSIS

Causative agent most directly related to accident (Object, substance, material, machinery, equipment, conditions):

\_\_\_\_\_

Was weather a factor?: \_\_\_\_\_

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Unsafe mechanical/physical/environmental condition at time of incident (Be specific):

Unsafe act by injured and/or others contributing to the incident (Be specific, must be answered):

Personal factors (Improper attitude, lack of knowledge or skill, slow reaction, fatigue):

Level of personal protection equipment required in Site Safety Plan: \_\_\_\_\_

Modifications: \_\_\_\_\_

Was injured using required equipment?: \_\_\_\_\_

If not, how did actual equipment use differ from plan: \_\_\_\_\_

**ACTION TAKEN TO PREVENT RECURRENCE**

(Be very specific. What has or will be done? When will it be done? Who is the responsible party to insure that the correction is made?)

HSO At Site: \_\_\_\_\_

\_\_\_\_\_  
Name Printed

\_\_\_\_\_  
Title

\_\_\_\_\_  
Date

\_\_\_\_\_  
Signature