SITE SPECIFIC HEALTH & SAFETY PLAN
FOR
CATLIN ENGINEERS AND SCIENTISTS PERSONNEL

HEALTH AND SAFETY PLAN

FOR

WILMINGTON, NORTH CAROLINA

Invista S.à.r.l.
North Terminal
3325 River Rd
Wilmington, North Carolina

Invista S.à.r.l.
South Terminal
3334 River Rd
Wilmington, North Carolina

SEPTEMBER 2006

PREPARED FOR:

FLINT HILLS RESOURCES, LP

CATLIN PROJECT NO. 201-125 AND 199-023

PREPARED BY:

CATLIN ENGINEERS AND SCIENTISTS
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SITE SPECIFIC HEALTH & SAFETY PLAN

A. SITE INFORMATION

Site:

Invista S.à.r.l. (Invista) North Terminal
3325 River Rd
Wilmington, NC 28412

Invista South Terminal
3334 River Rd
Wilmington, NC 28412

Invista Contact Person: Donna Lazzari Phone: 910-341-3146

Client: Reiss Remediation, LLC (Reiss) on behalf of Flint Hills Resources, LP (FHR)
12550 Trinity Boulevard
Euless, Texas 76040

Client Contact: Elizabeth Page, P.G. Phone: 817-685-3424
Cellular: 817-723-4616

FHR Contact Person: Nicole Cory Phone: 316-828-7249
Cellular: 316-200-7292

Catherine Cross Phone: 316-828-6073
Cellular: 316-737-2311

CATLIN Project Manager: Jeffery K. Becken, P.E. Phone: 910-452-5861
Cellular: 910-443-1961

CATLIN Project Geologist: Steve Tyler Phone: 910-452-5861

CATLIN Site Manager (SM): Varies – Pending activities

B. BRIEF DESCRIPTION OF SITE

The Invista North Terminal is a bulk chemical and fuel storage and transfer facility, which occupies an area of approximately 33 acres located on the east side of River Road. The North Terminal areas of environmental concern are as illustrated on the attached Figure 2. These areas are identified as the Paraxylene (PX) Facility, the Gasoline/#2 Fuel Oil Facility and the Loading Rack Area. Primary structures within the North Terminal PX Facility consist of active Above Ground Storage Tanks (ASTs), inactive truck loading rack, active railcar loading facility and numerous other structures user to support terminal operations. Primary structures within the North Terminal Gasoline/#2 Fuel Oil Facility consist of an inactive office and various storage structures.

The Invista South Terminal is a bulk storage facility occupying approximately twenty-five acres between River Road and the Cape Fear River, on the west side of River Road. The South Terminal has historically been utilized as a gasoline and chemical (toluene, Sure Sol 100, and Sure Sol 150) bulk storage facility. Primary structures within South Terminal include five inactive ASTs (M-1, M-2, M-3, M-4, and M-5), an inactive three bay truck loading rack (chemicals only) and an active product load/offload dock on the Cape Fear River.

C. ORGANIZATION & RESPONSIBILITIES

The following CATLIN personnel are designated to carry out job functions on site. Their responsibilities (i.e. field team leader, etc.) and general tasks they will be carrying out on the site are listed below.

NAME	RESPONSIBILITY & TASKS
Jeff Becken	Project Manager/Engineer
Rick Catlin	Principal
Mike E. Mason	Engineer
Mike D. Mason	Engineer
Larry Wessell	Scientist
Steve Tyler	Project Geologist
Dimitri Talbert	Scientist
Shane Chastain	Scientist
Bill Miller	Driller/Field Technician
Bobbie Fowler	Driller/Field Technician
John Wood	Driller/Field Technician
Tom Stetler	Geologist
Charles Ray	Geologist
Ben Ashba	Scientist
Johli Carscallen	Scientist
Justin Heter	Scientist
Anthony Chance	Drill Help/Field Technician
Sam Chance	Drill Help/Field Technician

D. SITE CONTROL

All CATLIN personnel will sign in and out of the facility in accordance with the latest Invista site access and safety training. Please note that Invista may require Wilmington Area Contractor Safety Council (WACSC) protocol training in the future. CATLIN personnel will coordinate access, control and security with Invista personnel prior to start of work each day. All CATLIN site work may require either a hot or cold work permit, which needs to be verified with Invista personnel prior to the start of any work. Any work that involves excavating any deeper than 12 inches requires CATLIN completion and Invista approval of an Excavation Obstruction Identification Form or approved equivalent.

E. SITE ACTIVITIES

This document is intended to cover CATLIN in the event of remediation, drilling, sampling and monitoring activities routinely completed by personnel at the Invista North and South terminal project sites. CATLIN's remediation activities include free-phase product recovery, groundwater recovery well operation and maintenance, air sparge maintenance and operation, soil remediation activities by in-situ or ex-situ

technologies and in-situ chemical oxidation. Drilling activities completed at the sites by CATLIN include well installation and well abandonment. Site sampling and monitoring activities completed include surveying, free-phase product gauging, soil sampling, soil remediation monitoring, groundwater sampling and chemical oxidation groundwater sampling.

F. HAZARD EVALUATION

Chemicals and fuels known to have been previously stored at the North and South Terminals are as follows:

Product	Status
North Terminal	
Unleaded Regular Gasoline	Abandoned
Unleaded Premium Gasoline	Abandoned
Low Sulfur No.2 Fuel Oil	Abandoned (active at site boiler house)
High Sulfur No.2 Fuel Oil	Abandoned
Amoco Ultimate Unleaded Premium Gasoline	Abandoned
Paraxylene	Active
Gasoline Additives	Abandoned
South Terminal	
Unleaded Regular Gasoline	Inactive
Sure Sol 100	Inactive
Sure Sol 150	Inactive
Toluene	Inactive

See Appendix A for Material Safety Data Sheets for the chemicals currently and previously stored at the subject sites.

CATLIN's primary function on-site involves assessing and remediating areas of environmental concern due to historical product releases. The following is a summary of product phases detected within the subsurface of the subject sites:

Free-Phase Product

North Terminal
Paraxylene
Fuel Oil / Gasoline
South Terminal
Fuel Oil

Remnant Phase Petroleum Hydrocarbon Compounds – Soil

CATLIN tasks include periodically obtaining surficial soil samples for analysis of dissolved hydrocarbon constituents. The following is a summary of the dissolved hydrocarbon constituents previously detected (see * and ** below) within the site's subsurface soils with concentrations in excess of current North Carolina Soil-to-Groundwater Maximum Soil Contamination Concentration (STGW MSCC) or Total Petroleum Hydrocarbon (TPH) as of the date of this Health and Safety Plan preparation (maximum values observed to date).

Compound	Highest Concentrations Exceeding STGW MSCCs (mg/kg)
North Terminal *	
Benzene	0.58
n-Butyl benzene	43
Sec-Butyl benzene	11
Ethylbenzene	160
Isopropyl benzene	19
4-Isopropyl toluene	7.3
MTBE	1.2
Naphthalene	83
n-Propylbenzene	77
Toluene	360
1, 2, 4 –Trimethylbenzene	500
1, 3, 5 –Trimethylbenzene	140
M/P-Xylenes	1,800
O-Xylenes	240
TPH-Diesel	12,000
TPH-Gasoline	10,000
Total Lead	68
South Terminal **	
TPH-Diesel	3,300

* Compound concentration data of the specific analytes is based on the laboratory sample analysis of site soil samples CATLIN collected between 9/2001 to 2/2002 for the Loading Rack Area and reported in the Corrective Action Plan Addendum dated August 9, 2002. TPH concentration data is based on 2005/2006 sampling from the Gasoline/#2 Fuel Oil Facility. No current soil data is available for the PX Facility.
** Compound concentration data is based on the laboratory sample analysis of site soil samples CATLIN collected between 2/2005 and 8/2005 and reported in the Annual Remediation Update Report dated 8/25/2005.

Dissolved Phase Petroleum Hydrocarbon Compounds – Groundwater

CATLIN tasks include periodically obtaining surficial groundwater samples for analysis of dissolved hydrocarbon constituents. The following is a summary of dissolved hydrocarbon constituents previously detected (see * below) within the site's surficial groundwater with concentrations in excess of current NCAC T15A:02L Groundwater Quality Standards as of the date of this Health and Safety Plan preparation.

Compound	Highest Concentration (ppm)
North Terminal*	
Benzene	2.0
Ethylbenzene	1.3
Isopropyl benzene	0.100
MTBE	0.600
Naphthalene	0.920
n-Propylbenzene	0.170
1, 2, 4 -Trimethylbenzene	2.200
1, 3, 5 -Trimethylbenzene	0.470
M/P Xylenes	170.00
Toluene	5.200
2-Methylnaphthalene	0.077
Lead	0.095
Bis (2-ethylhexyl)phthalate	0.052
South Terminal**	
Ethylbenzene	0.740
Naphthalene	0.350
Toluene	0.260
1, 2, 4 -Trimethylbenzene	2.700
1, 3, 5 -Trimethylbenzene	0.780
Total Xylenes	4.200

* Compound concentration data is based on the laboratory sample analysis of site groundwater samples CATLIN collected in February 2006.
ppm – part per million
** Compound concentration data is based on the laboratory sample analysis of site groundwater samples CATLIN collected between 2/2005 and 8/2005.

The following is a summary of the NIOSH database exposure limits for petroleum hydrocarbon compounds listed in the above soil and groundwater tables.

COMPOUND	EXPOSURE LIMITS		
	NIOSH REL	OSHA PEL	IDLH
NORTH TERMINAL			
Benzene	Ca TWA 0.1 ppm (0.319 mg/m^3)	TWA 1 ppm (3.19 mg/m^3)	Ca 500 ppm
n-Butyl benzene	ND	ND	ND
Sec-Butyl benzene	ND	ND	ND
Ethylbenzene	TWA 100 ppm (435 mg/m^3)	TWA 100 ppm (435 mg/m^3)	800 ppm
Isopropyl benzene	TWA 50 ppm (245 mg/m^3)	TWA 50 ppm (245 mg/m^3)	900 ppm
MTBE	ND	ND	ND
4-Isopropyl toluene	ND	ND	ND
Naphthalene	TWA 10 ppm (50 mg/m^3)	TWA 10 ppm (50 mg/m^3)	250 ppm
n-Propyl benzene	ND	ND	ND
1,2,4-Trimethylbenzene	TWA 25 ppm (125 mg/m^3)	None	ND
1,3,5-Trimethylbenzene	TWA 25 ppm (125 mg/m^3)	None	ND
O, M and P-Xylenes	TWA 100 ppm (435 mg/m^3)	TWA 100 ppm (435 mg/m^3)	900 ppm

COMPOUND	EXPOSURE LIMITS		
	NIOSH REL	OSHA PEL	IDLH
SOUTH TERMINAL			
Benzene	Ca TWA 0.1 ppm (0.319 mg/m^3)	TWA 1 ppm (3.19 mg/m^3)	Ca 500 ppm
Ethyl Benzene	TWA 100 ppm (435 mg/m^3)	TWA 100 ppm (435 mg/m^3)	800 ppm
Naphthalene	TWA 10 ppm (50 mg/m^3)	TWA 10 ppm (50 mg/m^3)	250 ppm
n-Propylbenzene	ND	ND	ND
Toluene	TWA 100 ppm (375 mg/m^3)	TWA 200 ppmc (10- minute maximum peak)	500 ppm
1,2,4 Trimethylbenzene	TWA 25 ppm (125 mg/m^3)	None	ND
1,3,5 Trimethylbenzene	TWA 25 ppm (125 mg/m^3)	None	ND
O, M and P-Xylenes	TWA 100 ppm (435 mg/m^3)	TWA 100 ppm (435 mg/m^3)	900 ppm

ppm – part per million
NIOSH – National Institute for Occupational Safety and Health
OSHA – Occupational Safety and Health Administration
IDLH – Immediately Dangerous to Life or Health concentration
REL – Recommended Exposure Limit
PEL – Permissible Exposure Limit
TWA – Time Weighted Average concentration for up to a 10-hour workday during a 40-hour workweek
Ca – substance that NIOSH considers to be potential occupational carcinogen
ND – indicates exposure level has not yet been determined.

The above information was obtained from the NIOSH Pocket Guide to Chemical Hazards website. Copies of the printout for the individual chemical hazards from the NIOSH database have been provided in Appendix C.

The following is a summary of the NIOSH database exposure limits for the products used for the site's in-situ chemical oxidation (remediation) efforts.

COMPOUND	EXPOSURE LIMITS		
	NIOSH REL	OSHA PEL	IDLH
NORTH TERMINAL (CHEMICAL OXIDATION)			
Hydrogen Peroxide 20-60%	TWA 1 ppm	TWA 1 ppm	75 ppm
Sulfuric Acid 77-100%	TWA 1 mg/m3	TWA 1 mg/m3	15 mg/m3
Ferrous Sulfate	TWA 1 mg/m3	None	Not Determined

Physical hazards known or suspected to be present on the site.

HAZARD	YES	NO	HAZARD	YES	NO
Overhead Power Lines	X		Aboveground/Buried Pipeline	X	
Buried Conduit	X		Steam Lines	X	
Uneven Ground	X				
Steep Slopes	X				
Slippery Conditions	X				
Rain	X				
Heavy Equipment	X				
Pinch Points on Rig	X				
Insects/snakes	X				

G. MONITORING EQUIPMENT

This section specifies the air monitoring equipment to be used on site and the action levels to upgrade to higher levels of personal protection for specific tasks. Air monitoring is not required for all tasks. The site activities listed in the table below are only tasks that require air monitoring. The minimum level of personal protective equipment is discussed within Section H of this Health and Safety Plan.

SITE ACTIVITY	MONITORING INSTRUMENT (S)	MONITORING INTERVAL	ACTION LEVEL			
			CONT.	D→C (ppm)	C→B (ppm)	Stop Work (ppm)
Trenching/ Excavation **Level D Initially**	FID/PID	Continuously	PX	100-250 units	>250 units	>250 units
			Gas/ Diesel	0-10 units	>10 units	>40 units
Soil Boring/ Well Installation **Level D Initially**	FID/PID	Continuously	PX	100-250 units	>250 units	>250 units
			Gas/ Diesel	0-10 units	>10 units	>40 units
Chemical Application **Level D Initially**	4 Gas Meter (O2)	Periodic monitoring if foaming or off-gassing is observed		19.5% to 23.5% Continue Work. Investigate changes from 21%.		<19.5% O2 or >23.5% O2.
	4 Gas Meter (LEL)			10% to 25% LEL Continue work. Increase monitoring frequency.		>25% LEL
	4 Gas Meter (H2S)			20 ppm	50 ppm	50 ppm
	FID/PID	Periodic monitoring if foaming or off-gassing is observed	PX	100-250 units	>250 units	>250 units
			Gas/ Diesel	0-10 units	>10 units	>40 units

- Note – Stop work level is when Level B is required. Do not proceed with work in Level B unless approved by the CATLIN Project Manager.
- Note- Policies could change as advised by Invista personnel.

H. PERSONAL PROTECTIVE EQUIPMENT (PPE)

FHR policy for all employees and subcontractors (CATLIN) is that all personnel in active site areas must wear at the minimum the following PPE: Hardhat, long or short sleeve shirts (no muscle shirts), long pants, and leather steel toe footwear.

This section lists the minimum additional equipment that must be present on the site and used during the specified protection level. This checklist is used when preparing for the field. **X**= CATLIN equipment that must be present on the site. **O** = Optional equipment.

DESCRIPTION	LEVEL OF PROTECTION		
	D	C	B
FULL BODY			
Coveralls	O		
Tyvek	O**		
Saranex			
Plastic Suit			
Splash Apron	O		
Rain Suit	O		
Chemical/Acid Resistant Rainwear	O	X	
HEAD			
Hard Hat	X	X	
Head Warmer			
EYES AND FACE			
Safety Glasses	X		
Sweat Bands	O		
Goggles	X*/**		
Splash Guard	O		
HANDS AND ARMS			
Chemical Resistant Gloves - Latex	X	X	
Nitrile Rubber	X**	X	
Natural Rubber			
PVC/Surgical			
Insulated Gloves			
Work Gloves	X		
FOOTWEAR			
Leather steel toe footwear	X		
Natural rubber steel toe boots	O		
FOOT			
Safety Boots			
Steel-Toe Safety Boots	X		
Rubber, Chemical Resistant Boots		X	
Rubber Boots			
Disposable Boot Covers	O		

DESCRIPTION	LEVEL OF PROTECTION		
	D	C	B
RESPIRATORY PROTECTION			
½ Mask APR			
Full Face APR with organic vapor/acid gas cartridges		X	
Dust Protection			
Full Face Canister APR			
Air Line/SCBA			
OTHER SUPPLIES			
First Aid Kit	X		
Fire Extinguisher	X		
Mobile Phone	O*		
Walkie Talkies			
Drinking Fluids	X		
Eye Wash Station	X		
Wash & Dry Towelettes			

* If CATLIN work involves contact (sampling, pump repair, etc.) with impacted groundwater, then the following minimum PPE is required: goggles and/or splashguard and Nitrile gloves. Personnel with prescription eyewear can utilize wraparound eyewear and/or splashguard.
** If CATLIN work involves contact (recovery, sampling, pump repair, etc.) with free phase product, then the following minimum PPE is required: goggles and/or splashguard, Saranex coveralls, and Nitrile gloves.

The following is a list of required PPE levels for typical CATLIN site work:

TYPE	Minimum Level of PPE	TYPE	Minimum Level of PPE
Soil Sampling	D	Geophysical Survey	D
Groundwater Sampling	D	Site Visit	D
Surface-Water Sampling	D	Drum Sampling	D
Sediment Sampling	D	Surveying	D
Air Sampling/Monitoring	D	Excavation	D
Drilling/DPT	D	Field Measurements	D
Pilot Testing	D	Chemical Application	C

NOTE: Changing site conditions or Invista policies may require a higher level of PPE.

I. DECONTAMINATION PROCEDURES

Personnel and equipment leaving an exclusion zone shall be decontaminated. Decontamination protocol shall be used with the following decontamination stations:

LEVEL C DECONTAMINATION STEPS		LEVEL D DECONTAMINATION STEPS	
1	Drop equipment.	1	Drop equipment.
2	Wash and rinse outer garment, boots, and gloves.	2	Wash and rinse boots and gloves.
3	Remove disposable garment, boots and gloves.	3	Remove disposable garment, outer boots, and gloves.
4	Change cartridge (if necessary).	4	Field wash.
5	Remove respiratory protection.		
6	Field wash.		

The following decontamination equipment is required at the project site.

DECONTAMINATION EQUIPMENT CHECKLIST			
X	Scrub Brushes	X	Garbage Bags
	Waste Containers	X	Paper Towels
X	Soap	X	Isopropyl Alcohol
X	Chemical Resistant Gloves	X	Pump Spray Bottles
X	Plastic Drop Cloths or Plastic Tubs	X	Pump Spray Bottles (water)

J. EMERGENCY PLANNING

1. FIRST AID AND EMERGENCY EQUIPMENT

	EQUIPMENT	LOCATION		EQUIPMENT	LOCATION
X	First Aid Kit	Field Vehicle	X	Mobile Phone	Field Vehicle
X	Eye Wash Kit	Field Vehicle			
	Safety Shower				
X	Fire Extinguisher	Field Vehicle			

2. COMMUNICATION PROCEDURES

North Terminal
Location of the phone nearest to the work area is in the office building located next to the facility entrance gate. All on-site Invista personnel carry communication radios. **Mobile phones are not allowed inside the operating area (within diked areas) of the Paraxylene Facility at the North Terminal**. They are permitted in all other areas of the North and South terminals.

South Terminal
Mobile phones are to be in the company vehicle and used for communication outside of the active area (boat dock) within the South Terminal.

3. ACCIDENT PROCEDURES

All accidents and injuries must be reported immediately to the SM, and Invista safety personnel. The SM will:

- Stop the Job.
- Determine the severity of the situation. If needed:
  - Clear the work area.
  - Call or instruct someone to call emergency personnel (fire, ambulance, etc.)
  - Ensure that non-emergency medical attention is obtained if needed.
- The SM will immediately contact the Invista Safety & Health Contact or Site Manager. The SM will coordinate the Emergency Response Procedures.
- Determine the cause and correct it to prevent reoccurrence.
- Call the Project Manager and report the situation.
- Complete the paperwork required by Invista personnel.

4. EMERGENCY COMMUNICATION

The SM will be the Emergency Coordinator, and will be responsible for the entry and exit of response personnel, contacting emergency personnel, and reporting to the project manager. The following commands are commonly used for communication when verbal commands cannot be used:

• Hand gripping throat	= Out of air, cannot breathe.
• Grip partner's wrist or place both arms around the waist	= Leave area immediately, no debate.
• Hands on top of head	= Need assistance.
• Thumbs up	= OK, all right, I understand.
• Thumbs down	= No, negative.

5. EMERGENCY PHONE NUMBERS

Local Police	911
Local Ambulance	911
Local Fire Dept.	911
Local Hospital (New Hanover Regional Medical Center)	
Administrative (non-emergency line)	910-343-4800
Poison Control	800-222-1222
National Response Center	800-424-8802
ChemTrec Transportation Spill Notification	800-424-9300
United States Coast Guard	910-772-2191
CATLIN Engineers and Scientists	910-452-5861

6. HOSPITAL ROUTE

Refer to Figure 1 for hospital (New Hanover Regional Medical Center) route information.

K. GENERAL SAFETY RULES

1. Report all work injuries and illnesses immediately.

2. Report all unsafe acts or unsafe conditions to your supervisor.

3. Use seat belts when on Company business in any vehicles.

4. **Firearms, weapons, or explosives are not permitted** on Company property.

5. Use, possession, sale or being under the influence of illegal drugs, misuse of prescription drugs and/or alcohol is not permitted on Company property or while "on duty".

6. **Under no circumstances** shall a CATLIN employee enter a confined space.

7. Keep work areas clean and aisles clear. Do not block emergency equipment, gates or exits.

8. Wear, inspect and use the prescribed Personal Protective Safety Equipment. This includes foot protection, head protection, gloves, etc.

9. Smoking is permitted only in the designated "Smoking Areas".

10. In the event of potential or actual fire or explosion, evacuate the area immediately. Assemble in a designated area and conduct a head count of all personnel. Notify the fire department. **Do not** attempt to fight the fire. Notify on-site Invista personnel and the CATLIN project manager.

L. MEDICAL MONITORING

CATLIN's Medical Monitoring Program provides medical surveillance of employees who may be exposed to hazardous substances or health hazards, or which may be required to wear respiratory protection. The physical examinations will be performed:

- At least every 12 months;
- At more frequent intervals if determined medically necessary;
- If an employee is injured, becomes ill or develops symptoms due to overexposure involving hazardous substances or health hazards;
- Additionally, a physical examination may also be performed at termination of employment.

M. EDUCATION AND TRAINING

CATLIN employees are provided with initial indoctrination and continuing training to enable them to perform their work in a safe manner (as required by OSHA and 29 CFR 1910.120). Training requirements are based on the specific job/tasks that the employee is responsible for performing. Types of training provided to employees include, but may not be limited to:

- 40 Hour Hazardous Waste Operations and Emergency Response (HAZWOPER)
- 8 Hour annual HAZWOPER Refresher
- HAZWOPER Management/Supervisor
- Confined Space Awareness/Entry
- North Carolina Asbestos Hazard Management Branch (NCAHMB) Asbestos Inspector/ Management Planner
- First Aid/CPR
- General Construction Safety

Due to recent ownership changes, further training requirements are unknown. CATLIN personnel should check in with Invista personnel daily for applicable work permits. In the future, WACSC training may be required for all site personnel.

N. SIGNATURES

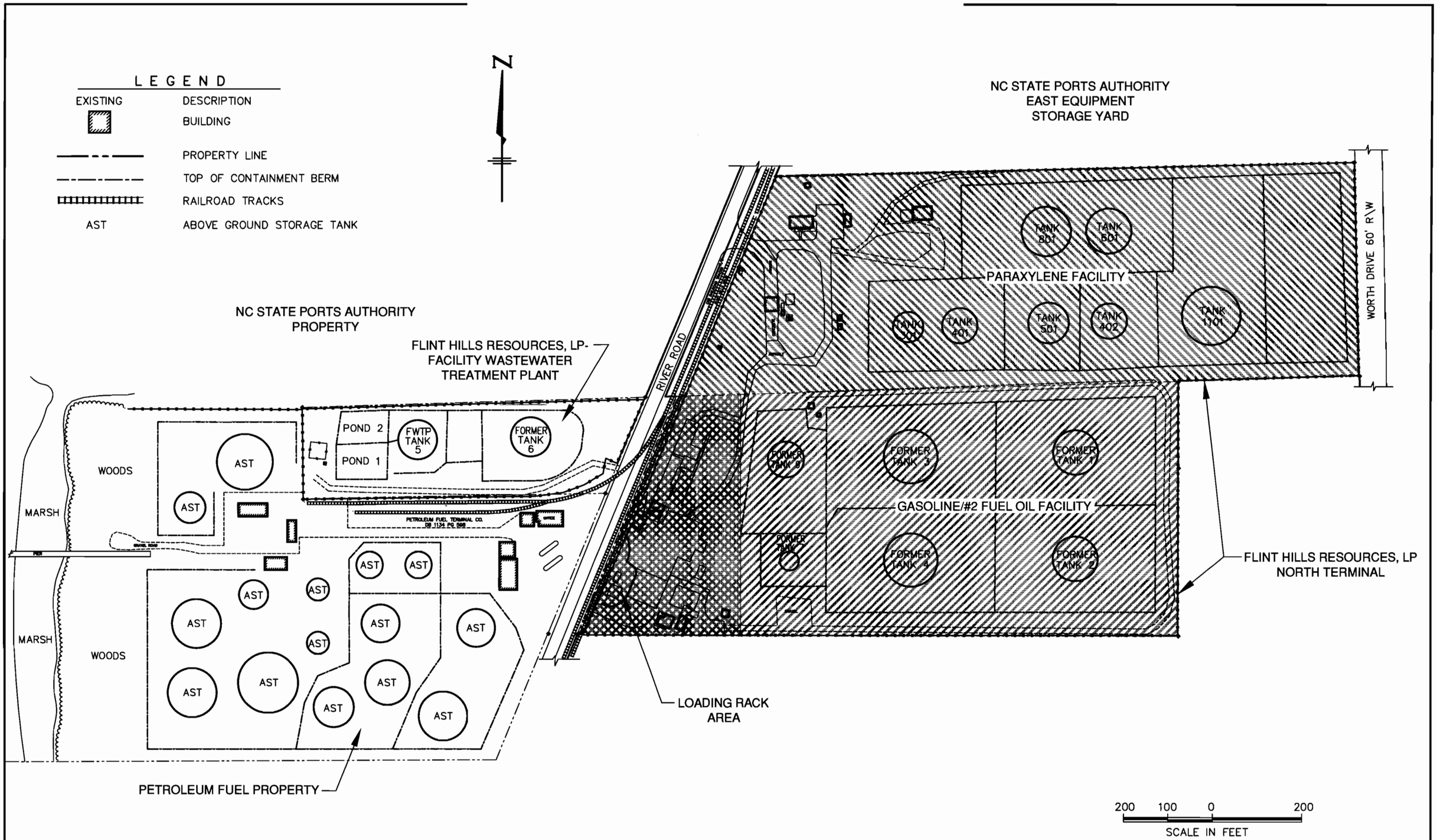
By signing below, CATLIN Personnel acknowledges they have read, understand and will abide by the measures indicated in this Safety Plan.

CATLIN Personnel NAME	DATE

FIGURES

5,000 2,500 0 5,000 10,000 Feet

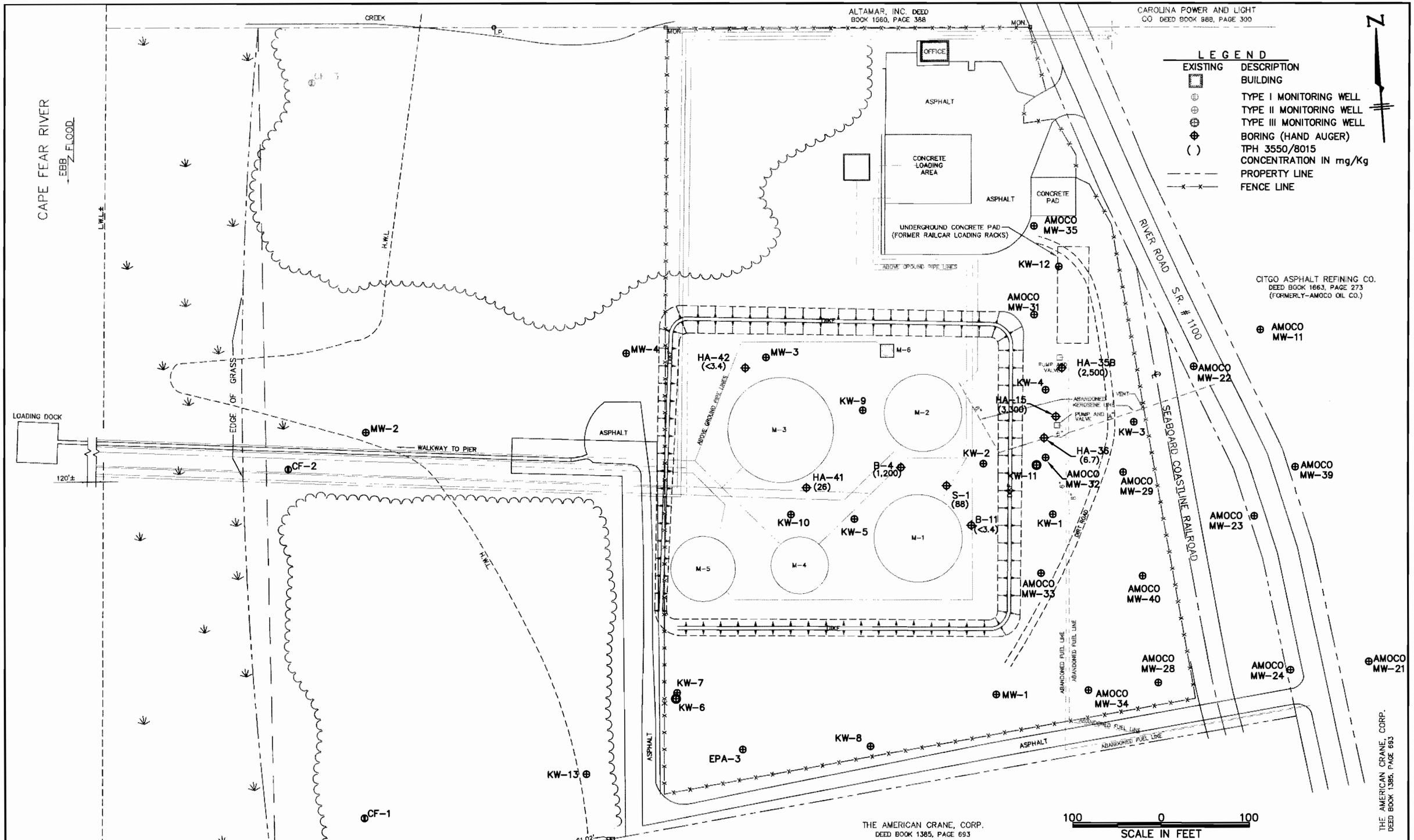
CATLIN ENGINEERS and SCIENTISTS Wilmington, North Carolina	PROJECT INVISTA S.à.r.l NORTH TERMINAL RIVER ROAD WILMINGTON, N.C.		TITLE HOSPITAL ROUTE MAP			FIGURE 1
	JOB NO. 201-125	DATE AUG 2006	SCALE AS SHOWN	DRAWN BY THW	CHECKED BY JKB	



NOTE:
1. MAP PROVIDED BY ROBERT H. GOSLEE & ASSOCIATES, P.A. JULY 2004.
2. PROPERTY LINES NOT SURVEYED.
3. PETROLEUM FUEL PROPERTY BASED ON AERIAL PHOTOGRAPHS.

CATLIN ENGINEERS and SCIENTISTS, WILMINGTON, NORTH CAROLINA	PROJECT: INVISTA, s.a.r.l. NORTH TERMINAL RIVER ROAD WILMINGTON, N.C.	TITLE: SITE MAP		FIGURE 2
	JOB NO. 201-125 / DATE: MAY 2005	SCALE: 1"=200'	DRAWN BY: BKW	CHECKED BY: JKB

201125-WORKPLAN-AUG06-02



NOTE:
1. FUEL AND PIPE LINE LOCATIONS ARE APPROXIMATE.
2. NCDENR ACTION LEVELS FOR TPH-DIESEL=40 mg/Kg.
3. TPH CONCENTRATIONS REPRESENT SOIL VADOSE CONTAMINATION.

ADAPTED FROM A SURVEY BY: CENTURY/ CONSULTING ENGINEERS & PLANNERS

CATLIN ENGINEERS and SCIENTISTS
WILMINGTON, NORTH CAROLINA

PROJECT	TITLE	FIGURE
INVISTA, s.a.r.l. SOUTH TERMINAL RIVER ROAD WILMINGTON, N.C.	SITE MAP	3
JOB NO. 201-125 / DATE: MAY 2005	SCALE: 1"=100' / DRAWN BY: BKW / CHECKED BY: JKB	

201125-WORKPLAN-AUG05-03

APPENDIX A

MATERIAL SAFETY DATA SHEETS
STORED PRODUCTS

KOCH

MATERIAL SAFETY DATA SHEET

1 CHEMICAL PRODUCT & COMPANY IDENTIFICATION

TRADE NAME: **PARAXYLENE**
CAS NUMBER: 106-42-3
MSDS NUMBER: 5028
PRODUCT CODE: 7100
SYNONYMS: P-XYLENE
1,4-DIMETHYLBENZENE
P-DIMETHYLBENZENE
P-METHYLTOLUENE
4-METHYLTOLUENE
1,4-XYLENE
P-XYLOL

MANUFACTURER/ SUPPLIER: Koch Refining Company, L. P.
PO Box 2608
Corpus Christi, TX
78403

TELEPHONE NUMBERS - 24 HOUR EMERGENCY ASSISTANCE:

Koch Refining Co.: 512-241-4811
CHEMTREC: 800-424-9300

TELEPHONE NUMBERS - GENERAL ASSISTANCE:

8-5 (M-F) 512-241-4811
8-5 (M-F) 316-828-8488

2 COMPOSITION / INFORMATION ON INGREDIENTS

Ingredient Name	CAS Number	Percentage*	Exposure Limits / Health Hazards
PARAXYLENE	106-42-3	99.7 - 100 %	100 ppm 8-Hour TWA (OSHA) 100 ppm 8-Hour TWA (ACGIH) 150 ppm 15-Min STEL (ACGIH)
ETHYLBENZENE	100-41-4	0 - 0.3 %	100 ppm 8-Hour TWA (OSHA) 100 ppm 8-Hour TWA (ACGIH) 125 ppm 15-Min STEL (ACGIH)
METAXYLENE	108-38-3	0 - 0.2 %	100 ppm 8-Hour TWA (OSHA) 100 ppm 8-Hour TWA (ACGIH) 150 ppm 15-Min STEL (ACGIH)
ORTHOXYLENE	95-47-6	0 - 0.1 %	100 ppm 8-Hour TWA (OSHA) 100 ppm 8-Hour TWA (ACGIH) 150 ppm 15-Min STEL (ACGIH)
TOLUENE	108-88-3	0 - 0.1 %	200 ppm 8-Hour TWA (OSHA) 50 ppm 8-Hour TWA (ACGIH)
BENZENE	71-43-2	0 - 10 PPM	1 ppm 8-Hour TWA (OSHA) 5 ppm 15-Min STEL (OSHA) 10 ppm 8-Hour TWA (ACGIH)

*Values do not reflect absolute minimums and maximums; those values may vary from time to time.

3 HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

HEALTH HAZARDS
WARNING!
MAY CAUSE CARDIAC SENSITIZATION
ASPIRATION HAZARD IF SWALLOWED-CAN ENTER LUNGS AND CAUSE DAMAGE
OVEREXPOSURE MAY CAUSE CNS DEPRESSION
MAY BE IRRITATING TO THE SKIN, EYES AND RESPIRATORY TRACT
POTENTIAL REPRODUCTIVE HAZARD

FLAMMABILITY HAZARDS
WARNING!
FLAMMABLE

REACTIVITY HAZARDS
STABLE

POTENTIAL HEALTH EFFECTS, SKIN

SLIGHTLY TO MODERATELY IRRITATING. Contact may cause reddening, itching and inflammation. Defatting agent. Repeated or prolonged contact may result in drying, reddening, itching, pain, inflammation, cracking and possible secondary infection with tissue damage.

No significant effects are expected to occur following short term exposure. Repeated or prolonged contact with large amounts of this material may result in absorption through the skin to produce toxic effects.

POTENTIAL HEALTH EFFECTS, EYE

SLIGHTLY TO MODERATELY IRRITATING. Exposure to vapors, fumes or mists may cause irritation. Direct contact may cause pain, tears, burns, sensitivity to light, swelling and possible corneal damage. Prolonged or repeated exposure may cause irritation and conjunctivitis.

POTENTIAL HEALTH EFFECTS, INHALATION

SLIGHTLY TOXIC. Breathing of the mists, vapors or fumes may irritate the nose, throat and lungs. Symptoms may include sore throat, coughing, labored breathing, sneezing and burning sensation, depending on the concentration and duration of exposure.

May cause central nervous system depression or effects. Symptoms may include headache, excitation, euphoria, dizziness, incoordination, drowsiness, light-headedness, blurred vision, fatigue, tremors, convulsions, loss of consciousness, coma, respiratory arrest and death, depending on the concentration and duration of exposure.

May cause cardiac sensitization, including arrhythmias (irregular heart beats) and death due to cardiac arrest.

Other specific symptoms of exposure are listed under "Special Toxic Effects".

Overexposure to this material may cause systemic damage including target organ effects listed under "Special Toxic Effects".

POTENTIAL HEALTH EFFECTS, INGESTION

MODERATELY TOXIC. May cause irritation of the mouth, throat and gastrointestinal tract. Symptoms may include salivation, pain, nausea, vomiting and diarrhea. Aspiration into lungs may cause chemical pneumonia and lung damage.

Exposure may also cause central nervous system symptoms similar to those listed under "Inhalation" (see Inhalation section). Overexposure to this material may cause systemic damage including target organ effects listed under "Special Toxic Effects".

SPECIAL TOXIC EFFECTS

Exposure may cause the following specific symptoms, depending on the concentration and duration of exposure: anemia, pallor and loss of appetite. Acute or chronic overexposure to this material or its components may cause systemic toxicity, including adverse effects to the following: kidney, liver, fetus and central nervous system.

IARC has determined that there is inadequate evidence for the carcinogenicity of xylene in humans and experimental animals. (IARC Class 3).

Reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage (sometimes referred to as solvent or painter's syndrome). Intentional misuse by deliberately concentrating and inhaling this product may be harmful or fatal.

May cause adverse reproductive and/or developmental effects. Pregnant women may be at an increased risk from exposure. Consumption of alcoholic beverages may enhance toxic effects.

Pre-existing medical conditions which may be aggravated by exposure include disorders of the skin, heart, kidney, liver and respiratory system.

4 FIRST AID MEASURES

SKIN

Immediately wash skin with plenty of soap and water while removing contaminated clothing and shoes. Get medical attention if irritation develops or persists.

Place contaminated clothing in closed container for storage until laundered or discarded. If clothing is to be laundered, inform person performing operation of contaminant's hazardous properties. Discard contaminated leather goods.

EYE

Flush immediately with large amounts of water for at least 15 minutes. Eyelids should be held away from the eyeball to ensure thorough rinsing. Get medical attention if irritation persists.

INHALATION

Remove to fresh air. If not breathing, institute cardiopulmonary resuscitation (CPR). If breathing is difficult, ensure clear airway and give oxygen. Keep affected person warm and at rest. GET IMMEDIATE MEDICAL ATTENTION.

INGESTION

Do not induce vomiting because of danger of aspirating liquid into lungs, causing serious damage and chemical pneumonitis. If spontaneous vomiting occurs keep head below hips to prevent aspiration and monitor for breathing difficulty. Gastric lavage should be performed only by qualified medical personnel. GET IMMEDIATE MEDICAL ATTENTION.

Keep affected person warm and at rest.

NOTES TO PHYSICIAN

Gastric lavage may be indicated if ingested. If spontaneous vomiting has occurred after ingestion, the patient should be monitored for difficult breathing, as adverse effects of aspiration into the lungs may be delayed up to 48 hours.

In cases of acute poisoning, artificial respiration with administration of oxygen may be useful for support. DO NOT GIVE EPINEPHRINE, EPHEDRINE OR SIMILAR ADRENERGIC DRUGS. THEY MAY INDUCE FATAL VENTRICULAR FIBRILLATION. Electrocardiographic monitoring should be carried out with severely ill patients to anticipate possible cardiac arrest.

Anemia may require the usual supportive measures. Medical evaluation of acute overexposure should include hematological determinations until stable. In severe acute and chronic poisoning, both renal and hepatic damage may occur and should be anticipated in such cases. Respiratory and pulmonary problems may require special attention. After severe acute symptoms have been alleviated, it may be advisable to consider periodic monitoring of the patient until such time as the likelihood of other adverse effects can be discounted.

5 FIRE FIGHTING MEASURES

HAZARDOUS COMBUSTION PRODUCTS

Combustion may produce CO, NOx, SOx and reactive hydrocarbons.

BASIC FIRE FIGHTING PROCEDURES

Use water spray, dry chemical, alcohol foam, all purpose AFFF or carbon dioxide to extinguish fire. Evacuate area and fight fire from a safe distance.

If leak or spill has not ignited, ventilate area and use water spray to disperse gas or vapor and to protect personnel attempting to stop a leak.

Use water spray to cool adjacent structures and to protect personnel. Shut off source of flow if possible. Stay away from storage tank ends. Withdraw immediately in case of rising sound from venting safety device or any discoloration of storage tank due to fire.

Firefighters must wear MSHA/NIOSH approved positive pressure breathing apparatus (SCBA) with full face mask and full protective equipment.

UNUSUAL FIRE & EXPLOSION HAZARDS

Vapors may form explosive mixture with air. Vapors can travel to a source of ignition and flash back.

Explosion hazard if exposed to extreme heat or to physical or thermal shock.

Fires involving this product may release carbon monoxide, carbon dioxide, reactive hydrocarbons and irritating vapors.

Flash Point:	81 F (27 C) TAG CLOSED CUP
AutoIgnition Temperature:	986 F (530 C)
Flammability Limits in Air, Lower, % by Volume:	1 %
Flammability Limits in Air, Upper, % by Volume:	7 %

6 ACCIDENTAL RELEASE MEASURES

EMERGENCY ACTION

Keep ignition sources out of area. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind. (See Exposure Controls/Personal Protection Section.) Keep unnecessary people at least 150 feet upwind of spill; greater distances may be necessary for people downwind.

ENVIRONMENTAL PRECAUTIONS

Eliminate all sources of ignition. Isolate hazard area and deny entry.

If product is released to the environment, take immediate steps to stop and contain release. Caution should be exercised regarding personnel safety and exposure to the released product. Notify local authorities and the National Response Center, if required.

SPILL OR LEAK PROCEDURE

Keep ignition sources out of area and shut off all ignition sources. Absorb spill with inert material (e. g. dry sand or earth) then place in a chemical waste container. Large Spills: Dike far ahead of liquid spill for later disposal. Shut off leak if safe to do so.

See Exposure Controls/Personal Protection section.

7 HANDLING & STORAGE

HANDLING

Ground lines and equipment used during transfer to reduce the possibility of static spark-initiated fire or explosion. Use non-sparking tools. Do not cut, grind, drill, weld or reuse containers unless adequate precautions are taken against these hazards.

Do not eat, drink or smoke in areas of use or storage.

STORAGE

Store in tightly closed containers in a cool, dry, isolated, well-ventilated area away from heat, sources of ignition and incompatibles. Avoid contact with strong oxidizers.

Empty containers may contain product residue. Do not reuse without adequate precautions.

8 EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS

Ventilation and other forms of engineering controls are the preferred means for controlling exposures.

EYE PROTECTION: PERSONAL PROTECTION EQUIPMENT (PPE)

Wear chemical safety goggles and face shield. Have eye washing facilities readily available where eye contact can occur.

SKIN PROTECTION: PERSONAL PROTECTION EQUIPMENT (PPE)
Avoid skin contact with this material. Use appropriate chemical protective gloves when handling.

Use good personal hygiene.

RESPIRATORY PROTECTION: PERSONAL PROTECTION EQUIPMENT (PPE)
A NIOSH/MSHA approved air purifying respirator with an organic vapor cartridge or canister may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits. Protection provided by air purifying respirators is limited. Use a positive pressure air supplied respirator if there is any potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air purifying respirators may not provide adequate protection.

9 PHYSICAL & CHEMICAL PROPERTIES

ODOR AND APPEARANCE
CLEAR, COLORLESS LIQUID WITH A MODERATE, AROMATIC ODOR

Boiling Point:	280 F (138 C)
Specific Gravity:	0.861
Melting Point:	55 F (13 C)
Percent Volatile:	100 %
Vapor Pressure:	9 MMHG @ 68 F (20 C)
Vapor Density:	3.7
Bulk Density:	ND
Solubility in Water:	NEGLIGIBLE
Octanol/Water Partn:	ND
Volatile Organic:	ND
Pour Point:	ND
pH Value:	ESSENTIALLY NEUTRAL
Freezing Point:	ND
Viscosity:	ND
Evaporation Rate:	MODERATELY FAST

P_2 = 0.080703 × 3.7
= 0.298 lb/FT3

Px weighs 7.209 #/gal.

Molecular Formula:	C8H10
Molecular Weight:	106.1600
Chemical Family:	AROMATIC HYDROCARBON
Odor Threshold:	ND

10 STABILITY & REACTIVITY

STABILITY/INCOMPATIBILITY
Incompatible with oxidizing agents. See precautions under Handling & Storage.

HAZARDOUS REACTIONS/DECOMPOSITION PRODUCTS
Combustion may produce CO, NOx, SOx and reactive hydrocarbons.

11 TOXICOLOGICAL INFORMATION

TOXICOLOGICAL DATA
See Special Toxic Effects (Section 3)

12 ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION
This product contains paraxylene which biodegrades in soil and water and oxidizes in air. This product is not expected to bioaccumulate in aquatic organisms.

13 DISPOSAL CONSIDERATIONS

WASTE DISPOSAL
This product, as supplied, when discarded or disposed of, is a hazardous waste according to Federal Regulations (40 CFR 261) due to its ignitability and benzene content. Under RCRA, it is the responsibility of the user of the product to determine, at the time of disposal, whether the product meets RCRA criteria for hazardous waste.

The transportation, storage, treatment and disposal of this waste material must be conducted in compliance with 40 CFR 262, 263, 264, 268 and 270. Disposal can occur only in properly permitted facilities. Check state and local regulations for any additional requirements as these may be more restrictive than federal laws and regulations. Chemical additions, processing or otherwise altering this material may make the waste management information presented in this MSDS incomplete, inaccurate or otherwise inappropriate. Disposal of this material must be conducted in compliance with all federal, state and local regulations.

14 TRANSPORT INFORMATION

BILL OF LADING (DOT)
Xylenes, (Paraxylene), 3, UN1307, PG III, RQ

Department of Transportation (DOT) Requirements:

Proper Shipping Name:	XYLENES, (PARAXYLENE)		
Hazard Class:	3	UN/NA Code:	UN1307
Packaging Group:	PG III		
Labels Required:	FLAMMABLE LIQUID		
Placards Required:	FLAMMABLE LIQUID, UN1307		
Reportable Quantity:	See Regulatory Information (Section 15)		

15 REGULATORY INFORMATION

FEDERAL REGULATIONS

Consult OSHA's Benzene standard 29 CFR 1910.1028 for provisions on air monitoring, employee training, medical monitoring, etc.

All major components of this product are listed on the TSCA Inventory.

This product, as supplied, contains Paraxylene, Metaxylene, Orthoxylene, Benzene, Toluene and Ethylbenzene all of which are regulated as hazardous substances per 40 CFR Part 302.4. The reportable quantities for these components are 100, 1000, 10, 1000 and 1000 pounds, respectively. Any release of this product that results in a release of these components equal to or exceeding the reportable quantities must be reported to the National Response Center (800-424-8802) and appropriate state and local regulatory agencies as described in 40 CFR Part 302.6 and 40 CFR 355.40. Failure to report may result in substantial civil and criminal penalties.

This product contains one or more components designated as hazardous substances or toxic pollutants pursuant to the Federal Clean Water Act (40 CFR 116.4 Table A; 40 CFR 401.15). Any unpermitted introduction of this product into a facility stormwater or wastewater discharge may constitute a violation of the Clean Water Act. Facilities must notify the appropriate permitting agency prior to introducing this product into the aforementioned discharges.

This product contains one or more substances listed as hazardous, toxic or flammable air pollutants under Section 112 of the Clean Air Act. This product contains up to 100 % volatile organic compounds (VOCs) per 40 CFR Part 51.100. This product contains up to 100 % hazardous air pollutants (HAPs) per Section 112 Clean Air Act Amendments of 1990.

There may be specific regulations at the local, regional or state level that pertain to this product.

STATE REGULATIONS

WARNING: This product may contain a chemical known to the State of California to cause cancer and birth defects or other reproductive harm.

This product, as sold, meets the requirements of the Model Toxics Legislation of the Coalition of Northeastern Govenors (CONEG). Any alteration of this product may affect its compliance with this law.

SARA TITLE III RATINGS:

Immediate Hazard: X Delayed Hazard: X Fire Hazard: X Pressure Hazard:

Reactivity Hazard:

NFPA RATINGS:

Health: 2 Flammability: 3 Reactivity: 0 Special Hazards:

HMIS RATINGS:

Health: Flammability: Reactivity: Personal Prot. Equip:

Following ingredients of this product are listed in SARA313:

SARA Listed Ingredient Name	CAS Number	Maximum %
PARAXYLENE	106-42-3	100.0000

16 OTHER INFORMATION

DISCLAIMER

NOTICE: The information presented herein is based on data considered to be accurate as of the date of preparation of this Material Safety Data Sheet. However, MSDS may not be used as a commercial specification sheet of manufacturer or seller, and no warranty or representation, expressed or implied, is made as to the accuracy or comprehensiveness of the foregoing data and safety information, nor is any authorization given or implied to practice any patented invention without a license. In addition, no responsibility can be assumed by vendor for any damage or injury resulting from abnormal use, from any failure to adhere to recommended practices, or from any hazards inherent in the nature of the product.

Completed On: 12/4/96 Replaces Sheet Dated: 12/1/95

Completed By: Safety & Emergency Response, Koch Industries, Inc.

KOCH

MATERIAL SAFETY DATA SHEET

CHEMICAL PRODUCT & COMPANY IDENTIFICATION

TRADE NAME	FUEL OIL NO. 2 (LOW SULFUR)
CAS NUMBER	68476-30-2
MSDS NUMBER	5465
PRODUCT CODE	ND
SYNONYM(S)	2 OIL, NO. 2 LOW SULFUR DIESEL, NO. 2 LOW SULFUR FUEL, HEATING OIL, PREMIUM DIESEL (LOW SULFUR), DIESEL FUEL, ARCTIC DIESEL, DIESEL FUEL NO. 2, DIESEL OIL, D-GRADE FUEL OIL, RAILROAD DIESEL, VIRGIN DIESEL APPLICABLE TO ALL GRADES
MANUFACTURER / SUPPLIER	Koch Petroleum Group, LP. PO Box 2256 Wichita, KS 67201

TELEPHONE NUMBERS - 24 HOUR EMERGENCY ASSISTANCE

Chemtrec:	800-424-9300
Koch Security:	316-828-6777

TELEPHONE NUMBERS - GENERAL ASSISTANCE

8-5 (M-F)	316-828-6777
8-5 (M-F, CST) MSDS Assistance	316-828-8488

COMPOSITION / INFORMATION ON INGREDIENTS

Ingredient Name	CAS Number	Concentration*	Exposure Limits / Health Hazards
C9-C16 HYDROCARBONS PRODUCED BY THE DISTILLATION OF CRUDE OIL	68476-30-2	99 - 100 %	ND
1,2,4-TRIMETHYLBENZENE	95-63-6	0 - 0.6 %	25 ppm 8-Hour TWA (ACGIH)
BIPHENYL	92-52-4	0 - 0.3 %	0.2 ppm 8-Hour TWA (OSHA) 0.2 ppm 8-Hour TWA (ACGIH)
NAPHTHALENE	91-20-3	0 - 0.2 %	10 ppm 8-Hour TWA (OSHA) 10 ppm 8-Hour TWA (ACGIH) 15 ppm 15-Min STEL (ACGIH)
XYLENES	1330-20-7	0 - 0.2 %	100 ppm 8-Hour TWA (OSHA) 100 ppm 8-Hour TWA (ACGIH) 150 ppm 15-Min STEL (ACGIH)
CUMENE	98-82-8	Trace	50 ppm 8-Hour TWA (OSHA) 50 ppm 8-Hour TWA (ACGIH)

ngredient Name	CAS Number	Concentration*	Exposure Limits / Health Hazards
TOLUENE	108-88-3	Trace	200 ppm 8-Hour TWA (OSHA) 50 ppm 8-Hour TWA (ACGIH)

Values do not reflect absolute minimums and maximums; these values are typical which may vary from time to time.

This Material Safety Data Sheet is intended to communicate potential health hazards and potential physical hazards associated with the product(s) covered by this sheet, and is not intended to communicate product specification information. For product specification information, contact your Koch Petroleum Group, LP. representative.

HAZARDS IDENTIFICATION

EMERGENCY OVERVIEW

HEALTH HAZARDS
WARNING!
MAY BE IRRITATING TO THE SKIN, EYES AND RESPIRATORY TRACT
OVEREXPOSURE MAY CAUSE CNS DEPRESSION
ASPIRATION HAZARD IF SWALLOWED-CAN ENTER LUNGS AND CAUSE DAMAGE
POTENTIAL REPRODUCTIVE HAZARD
SKIN CANCER HAZARD BASED ON TESTS WITH LABORATORY ANIMALS

FLAMMABILITY HAZARDS
COMBUSTIBLE
PER OSHA GUIDELINES, 29 CFR 1910.1200(c)

REACTIVITY HAZARDS
STABLE

POTENTIAL HEALTH EFFECTS, SKIN

MODERATELY IRRITATING. Repeated or prolonged skin contact may cause drying, reddening, itching and cracking.

No significant effects are expected to occur following short term exposure. Repeated or prolonged contact with large amounts of this material may result in absorption through the skin to produce toxic effects.

Contact with heated material may cause thermal burns.

POTENTIAL HEALTH EFFECTS, EYE

SLIGHTLY IRRITATING. Exposure to vapors, fumes or mists may cause irritation. May cause slight transient irritation, lacrimation (tears) and a burning sensation in the eyes. Prolonged or repeated exposure may cause irritation and conjunctivitis.

Contact with heated material may cause thermal burns.

POTENTIAL HEALTH EFFECTS, INHALATION

Petroleum mists at high exposure levels may be irritating to the nose, throat and lungs.

May cause central nervous system depression or effects. Symptoms may include headache, excitation, euphoria, dizziness, incoordination, drowsiness, light-headedness, blurred vision, fatigue, tremors, convulsions, loss of consciousness, coma, respiratory arrest and death, depending on the concentration and duration of exposure.

Overexposure to this material may cause systemic damage including target organ effects listed under "Special Toxic Effects."

Other specific symptoms of exposure are listed under "Special Toxic Effects."

POTENTIAL HEALTH EFFECTS, INGESTION

PRACTICALLY NON-TOXIC. Ingestion of large amounts may cause gastrointestinal disturbances. May cause irritation of the mouth, throat and gastrointestinal tract. Symptoms may include salivation, pain, nausea, vomiting and diarrhea.

Aspiration into lungs may cause chemical pneumonia and lung damage.

Exposure may also cause central nervous system symptoms similar to those listed under "Inhalation" (see Inhalation section).

Overexposure to this material may cause systemic damage including target organ effects listed under "Special Toxic Effects."

Other specific symptoms of exposure are listed under "Special Toxic Effects."

SPECIAL TOXIC EFFECTS

Acute or chronic overexposure to this material or its components may cause systemic toxicity, including adverse effects to the following: liver and kidney.

Exposure to components of this material may cause the following specific symptoms, depending on the concentration and duration of exposure: irritation of the hair follicles and blockage of the sebaceous glands.

This product contains C9 aromatics which may cause adverse reproductive and/or developmental effects.

IARC has determined that there is limited evidence for the carcinogenicity of fuel oil no. 2 in experimental animals and inadequate evidence in humans.

Lifetime exposure to whole diesel exhaust has been shown to cause cancer in laboratory animals. NIOSH recommends that whole diesel exhaust be regarded as a potential occupational carcinogen.

Reports have associated repeated and prolonged occupational overexposure to solvents with permanent brain and nervous system damage (sometimes referred to as solvent or painter's syndrome). Intentional misuse by deliberately concentrating and inhaling this product may be harmful or fatal.

Pre-existing medical conditions which may be aggravated by exposure include disorders of the skin, eye and respiratory system.

This product has not been tested as a whole for all potential health effects.

WARNING: The use of any hydrocarbon fuel in an area without adequate ventilation may result in hazardous levels of combustion products and inadequate oxygen levels.

FIRST AID MEASURES

SKIN

Immediately wash skin with plenty of soap and water while removing contaminated clothing and shoes. GET IMMEDIATE MEDICAL ATTENTION.

Place contaminated clothing in closed container for storage until laundered or discarded. If clothing is to be laundered, inform person performing operation of contaminant's hazardous properties. Discard contaminated leather goods.

EYE

Flush immediately with large amounts of water for at least 15 minutes. Eyelids should be held away from the eyeball to ensure thorough rinsing. Get medical attention if irritation persists.

INHALATION

Remove to fresh air. If not breathing, institute cardiopulmonary resuscitation (CPR). If breathing is difficult, ensure airway is clear and give oxygen.

Keep affected person warm and at rest. GET IMMEDIATE MEDICAL ATTENTION.

NGESTION

Do not induce vomiting because of danger of aspirating liquid into lungs, causing serious damage and chemical pneumonitis. If spontaneous vomiting occurs keep head below hips to prevent aspiration and monitor for breathing difficulty. Gastric lavage should be performed only by qualified medical personnel.

Keep affected person warm and at rest. GET IMMEDIATE MEDICAL ATTENTION.

NOTES TO PHYSICIAN

Gastric lavage may be indicated if ingested. If spontaneous vomiting has occurred after ingestion, the patient should be monitored for difficult breathing, as adverse effects of aspiration into the lungs may be delayed up to 48 hours.

FIRE FIGHTING MEASURES

HAZARDOUS COMBUSTION PRODUCTS

Combustion may produce COx, NOx, SOx, reactive hydrocarbons, irritating vapors and hydrogen sulfide.

EXTINGUISHING MEDIA

Use water spray, dry chemical, alcohol foam, all purpose AFFF or carbon dioxide to extinguish fire.

BASIC FIRE FIGHTING PROCEDURES

Evacuate area and fight fire from a safe distance. If leak or spill has not ignited, ventilate area and use water spray to disperse gas or vapor and to protect personnel attempting to stop a leak.

Use water spray to cool adjacent structures and to protect personnel. Shut off source of flow if possible. Stay away from storage tank ends. Withdraw immediately in case of rising sound from venting safety device or any discoloration of storage tank due to fire.

Firefighters must wear MSHA/NIOSH approved positive pressure breathing apparatus (SCBA) with full face mask and full protective equipment.

UNUSUAL FIRE & EXPLOSION HAZARDS

Vapors may form explosive mixture with air. Vapors can travel to a source of ignition and flash back.

Explosion hazard if exposed to extreme heat or to physical or thermal shock.

Fires involving this product may release COx, NOx, SOx, reactive hydrocarbons, irritating vapors and hydrogen sulfide.

Flash Point	> 125 F (> 52 C) PENSKY-MARTENS CLOSED CUP
Autoignition Temperature	494 F (257 C)
Flammability Limits in Air, Lower, % by Volume	0.6 %
Flammability Limits in Air, Upper, % by Volume	7.5 %

ACCIDENTAL RELEASE MEASURES

EMERGENCY ACTION

Eliminate and/or shut off ignition sources and keep ignition sources out of the area. Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind. Isolate for 1/2 mile in all directions if tank, rail car or tank truck is involved in release. Evacuate area endangered by release as required. (See Personal Protection Information Section.)

ENVIRONMENTAL PRECAUTIONS

Eliminate all sources of ignition. Isolate hazard area and deny entry.

If product is released to the environment, take immediate steps to stop and contain release. Caution should be exercised regarding personnel safety and exposure to the released product. Notify local authorities and the National Response Center, if required.

SPILL OR LEAK PROCEDURE

Keep ignition sources out of area and shut off all ignition sources. Absorb spill with inert material (e. g. dry sand or earth) then place in a chemical waste container. Large Spills: Dike far ahead of liquid spill for later disposal. Stop leak when safe to do so.

See Exposure Controls/Personal Protection (Section 8).

HANDLING & STORAGE

HANDLING

Ground lines and equipment used during transfer to reduce the possibility of static spark-initiated fire or explosion. Use non-sparking tools. Do not cut, grind, drill, weld or reuse containers unless adequate precautions are taken against these hazards.

Do not eat, drink or smoke in areas of use or storage.

STORAGE

Store in tightly closed containers in a cool, dry, isolated, well-ventilated area away from heat, sources of ignition and incompatibles. Avoid contact with strong oxidizers.

Empty containers may contain product residue. Do not reuse without adequate precautions.

Do not eat, drink or smoke in areas of use or storage.

EXPOSURE CONTROLS / PERSONAL PROTECTION

ENGINEERING CONTROLS

Ventilation and other forms of engineering controls are the preferred means for controlling exposures.

EYE PROTECTION: PERSONAL PROTECTION EQUIPMENT (PPE)

Wear chemical safety goggles and face shield. Have eye washing facilities readily available where eye contact can occur.

SKIN PROTECTION: PERSONAL PROTECTION EQUIPMENT (PPE)

Avoid skin contact with this material. Use appropriate chemical protective gloves when handling.

Use good personal hygiene.

RESPIRATORY PROTECTION: PERSONAL PROTECTION EQUIPMENT (PPE)

A NIOSH/MSHA approved air purifying respirator with an organic vapor cartridge or canister may be permissible under certain circumstances where airborne concentrations are expected to exceed exposure limits. Protection provided by air purifying respirators is limited. Use a positive pressure air supplied respirator if there is any potential for an uncontrolled release, exposure levels are not known, or any other circumstances where air purifying respirators may not provide adequate protection.

PHYSICAL & CHEMICAL PROPERTIES

ODOR AND APPEARANCE

CRYSTAL CLEAR TO PALE YELLOW OR GREEN COLORED LIQUID WITH HYDROCARBON ODOR; FOR TAX EXEMPT PURPOSES, THIS FUEL MAY CONTAIN RED DYE

Boiling Point	325 - 700 F (163-371 C)
Specific Gravity	0.835 - 0.9
Melting Point	-20 F (-29 C)
Percent Volatile	100 %
Vapor Pressure	2.6 mmHg AT 122 F (50 C)
Vapor Density	8
Bulk Density	ND
Solubility in Water	INSOLUBLE
Octanol/Water Partn	ND
Volatile Organic	ND
Pour Point	-20 TO 10 F (-29 TO -12 C) [ARCTIC DIESEL < -50 F (< -45 C)]
pH Value	ND
Freezing Point	ND
Viscosity	32.6 - 40.1 SSU AT 100 F (38 C)
Evaporation Rate	0.01

Molecular Formula	NA
Molecular Weight	ND
Chemical Family	HYDROCARBON MIXTURE
Odor Threshold	ND

STABILITY & REACTIVITY

STABILITY/INCOMPATABILITY

Incompatible with oxidizing agents. See precautions under Handling & Storage (Section 7).

HAZARDOUS REACTIONS/DECOMPOSITION PRODUCTS

Combustion may produce COx, NOx, SOx, reactive hydrocarbons, irritating vapors and hydrogen sulfide.

TOXICOLOGICAL INFORMATION

TOXICOLOGICAL DATA

See Special Toxic Effects (Section 3).

ECOLOGICAL INFORMATION

ECOTOXICOLOGICAL INFORMATION

ND

DISPOSAL CONSIDERATIONS

WASTE DISPOSAL

This product, as supplied, when discarded or disposed of, is a hazardous waste according to Federal Regulations (40 CFR 261) due to its ignitability. Under the Resource Conservation and Recovery Act (RCRA), it is the responsibility of the user of the product to determine, at the time of disposal, whether the material is a hazardous waste subject to RCRA.

The transportation, storage, treatment and disposal of RCRA waste material must be conducted in compliance with 40 CFR 262, 263, 264, 268 and 270. Disposal can occur only in properly permitted facilities. Check state and local regulations for any additional requirements as these may be more restrictive than federal laws and regulations. Chemical additions, processing or otherwise altering this material may make the waste management information presented in this MSDS incomplete, inaccurate or otherwise inappropriate. Disposal of this material must be conducted in compliance with all federal, state and local regulations.

TRANSPORT INFORMATION

BILL OF LADING - BULK (U. S. DOT)

Fuel Oil (No. 2), Combustible Liquid, NA1993, PG III

U. S. Department of Transportation (DOT) Requirements

General Transportation Information for Bulk Shipments

Proper Shipping Name	Fuel Oil (No. 2)		
Hazard Class	Combustible Liquid	UN/NA Code	NA1993
Packaging Group	PG III		
Labels Required	None		
Placards Required	Combustible Liquid, NA1993		
Reportable Quantity	See Regulatory Information (Section 15)		

General Transportation Information for Non-Bulk Shipments

Proper Shipping Name	Non-Regulated		
Hazard Class	NA	UN/NA Code	NA
Packaging Group	NA		
Labels Required	NA		
Placards Required	NA		
Reportable Quantity	NA		

Non-bulk shipments of this product are non-regulated for domestic ground transportation when they meet the requirements of 49 CFR 173.150(f).

REGULATORY INFORMATION

FEDERAL REGULATIONS

All known major components of this product are listed on the TSCA Inventory and/or are otherwise in compliance with TSCA.

A release of this product, as supplied, is exempt from reporting under the Comprehensive Environmental Response Compensation and Liability Act (CERCLA) by the petroleum exclusion. Releases may be reportable to the National Response Center (800-424-8802) under the Clean Water Act, 33 U.S.C. 1321(b)(3) and (5). Check state and local regulations for any additional requirements as these may be more restrictive than federal laws and regulations. Failure to report may result in substantial civil and criminal penalties.

This product does not contain toxic chemicals (in excess of the applicable de minimis concentration) that are subject to the annual toxic chemical release reporting requirements of the Superfund Amendments and Reauthorization Act (SARA) Section 313 (40 CFR 372).

This product contains one or more components designated as hazardous substances or toxic pollutants pursuant to the Federal Clean Water Act (40 CFR 116.4 Table A; 40 CFR 401.15). Any unpermitted introduction of this product into a facility stormwater or wastewater discharge may constitute a violation of the Clean Water Act. Facilities must notify the appropriate permitting agency prior to introducing this product into the aforementioned discharges.

This product contains one or more substances listed as hazardous, toxic or flammable air pollutants under Section 112 of the Clean Air Act.

There may be specific regulations at the local, regional or state/provincial level that pertain to this product.

STATE REGULATIONS

WARNING: This product contains a chemical known to the State of California to cause birth defects or other reproductive harm.

SARA TITLE III RATINGS

Immediate Hazard	X	Delayed Hazard	X	Fire Hazard	X	Pressure Hazard	-
Reactivity Hazard	-						

NFPA RATINGS

Health	1	Flammability	2	Reactivity	0	Special Hazards	-

HMIS RATINGS

Health	2*	Flammability	2	Reactivity	0

Following ingredients of this product are listed in SARA313

SARA Listed Ingredient Name	CAS Number	Maximum %
XYLENES	1330-20-7	0.2

OTHER INFORMATION

DISCLAIMER

NOTICE: The information presented herein is based on data considered to be accurate as of the date of preparation of this Material Safety Data Sheet. However, MSDS may not be used as a commercial specification sheet of manufacturer or seller, and no warranty or representation, expressed or implied, is made as to the accuracy or comprehensiveness of the foregoing data and safety information, nor is any authorization given or implied to practice any patented invention without a license. In addition, no responsibility can be assumed by vendor for any damage or injury resulting from abnormal use, from any failure to adhere to recommended practices, or from any hazards inherent in the nature of the product

Completed On	12/23/98	Replaces Sheet Dated	6/15/98
Completed By	Safety & Emergency Response, Koch Industries, Inc.		

APPENDIX B

MATERIAL SAFETY DATA SHEETS
CHEMICAL OXIDATION PRODUCTS

Hydrogen Peroxide 20-60%

Hydrogen Peroxide 20-60%

Material Safety Data Sheet; H_2O_2-2060

Chemical: Hydrogen Peroxide 20-60%

NFPA: H=3 F=0 I= 1 S=OX
HMIS: H=3 F=0 R=1 PPE= Supplied by user; dependent on conditions

MSDS Number: H2O2-2060-0903
Effective Date: 1 September 2003
Issued by: Solvay Chemicals, Inc. Regulatory Affairs Department

Not valid three years after effective date or after issuance of superseding MSDS, whichever is earlier. French or Spanish translations of this MSDS may be available. Check www.solvaychemicals.us or call Solvay Chemicals, Inc. to verify the latest version or translation availability.

Material Safety Data Sheets contain country specific regulatory information; therefore, the MSDS's provided are for use only by customers of Solvay Chemicals, Inc. in North America. If you are located in a country other than the UnitedStates, please contact the Solvay Group company in your country for MSDS information applicable to your location.

1. Company and Product Identification

1.1 Product Name: Hydrogen Peroxide 20-60%
Chemical Name: Hydrogen Peroxide, Aqueous Solution
Synonyms: Hydrogen dioxide, hydroperoxide, peroxide
Chemical Formula: H_2O_2
Molecular Weight: 34
CAS Number: 7722-84-1
EINECS Number: 231-765-0

Grades/Trade Names:
27.5% - Technical
31% - Electronic , Electronic Low Carbon, UltraPure, UltraHigh Purity, UltraPure Plus, Pico-Pure™
35% - Technical, Technical 35/D, Cosmetic, Food, PFP™, Chemical, High Purity Food
40% - Technical
50% - Technical, Technical 50/D, Dilution, Cosmetic, Electronic, Food, PFP™, UltraPure, Chemical, Chemical LP, SVP-HP®[1]

[1] SVP-HP® is a trademark of EKA Chemicals

1.2 Recommended Uses: Used in bleaching textiles, food, hair, paper and other materials; component of rocket propellant; used in the manufacture of a wide range of chemicals, plastics, pharmaceuticals; used in photography, electroplating, water treatment and wastewater treatment.

1.3 Supplier: Solvay Chemicals, Inc.
PO BOX 27328 Houston, TX 77227-7328
3333 Richmond Ave. Houston, Texas 77098

Solvay Chemicals

SOLVAY

Interox, Fluorides & Minerals

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Ingestion:
- Paleness and cyanosis of the face.
- Severe irritation, risk of burns and perforation of the gastrointestinal tract accompanied by shock.
- Excessive fluid in the mouth and nose, with risk of suffocation.
- Risk of throat, edema (fluid in lungs) and suffocation.
- Nausea, vomiting (bloody).
- Cough.
- Risk of chemical pneumonitis from product inhalation.

Carcinogenicity: See section 11.3

4. First Aid Measures

General Recommendations:
- In case of product splashing into the eyes and face, treat eyes first.
- Do not dry soiled clothing near an open flame or incandescent heat source.
- Submerge soiled clothing in water prior to drying.

4.1 Inhalation:
- Remove the subject from the contaminated area.
- Consult with a physician in case of respiratory symptoms.

Eyes:
- Flush eyes as soon as possible with running water for 15 minutes, while keeping the eyelids open.
- In the case of difficulty of opening the lids, administer an analgesic eye wash (oxybuprocaine).
- Consult with an ophthalmologist in all cases.

Skin:
- Remove contaminated shoes, socks and clothing, under a shower if necessary; wash the affected skin with running water.
- Keep warm (blanket), provide clean clothing.
- Consult with a physician in all cases.

Ingestion:
- Consult with a physician immediately in all cases.
- Take to a hospital.

If the subject is completely conscious:
- Rinse mouth with fresh water.
- Do not give anything to drink.
- Do not induce vomiting.

If the subject is unconscious:
- NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSIOUS PERSON.
- Loosen collar and tight clothing, lay the victim on his/her left side.
- Oxygen or pulmonary resuscitation if necessary.
- Keep warm (blanket).

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- Wear self contained breathing apparatus when in close proximity or in confined spaces.
- When intervention in close proximity, wear full protective acid resistant suit.
- After intervention, proceed to clean the equipment. Take a shower, remove clothing carefully, clean and check.

Other precautions:

- If safe to do so, remove the exposed containers, or cool with large quantities of water.
- Stay upwind.
- Keep at a safe distance in a protected location.
- Never approach containers which have been exposed to fire, without cooling them sufficiently.

6. Accidental Release Measures

6.1 Precautions:

- Observe protective measures given in section 5 and 8.
- Isolate area.
- Approach from upwind.
- Avoid materials and products which are incompatible with the product (see section 10).
- If safe to do so, without exposing personnel, try to stop the spillage.
- In case of contact with combustible materials, avoid product drying out by dilution with water.

6.2 Cleanup methods:

- If possible dam large quantities of liquid with sand or earth.
- Dilute with large quantities of water.
- Do not add chemical products.
- For disposal methods, refer to section 13.
- In order to avoid the risk of contamination, the recovered product must not be returned to the original tank/container.

6.3 Precautions for protection of the environment:

- Immediately notify the appropriate authorities in case of reportable spill.
- The National Transportation Safety Board (NTSB) and Federal Aviation Administration (FAA) have requested the following information be provided:

  Combustible materials exposed to hydrogen peroxide should be immediately submerged in or rinsed with large amounts of water to ensure that all hydrogen peroxide is removed.

  Residual hydrogen peroxide that is allowed to dry (upon evaporation hydrogen peroxide can concentrate) on organic materials such as paper, fabrics, cotton, leather, wood or other combustibles can cause the material to ignite and result in a fire.

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8.2 Exposure Controls:

8.2.1 Occupational Exposure Controls:

8.2.1.1 Ventilation:

- Provide local ventilation.
- Follow the protective measures given in section 7.
- Provide ventilation in work areas to keep exposure below applicable limits. See Section 8.1

8.2.1.2 Respiratory protection: NIOSH approved full-face supplied air respirator for excessive concentrations.

8.2.1.3 Hand protection: Chemical resistant protective gloves made of PVC or rubber.

8.2.1.4 Eye protection: Wear protective goggles for all industrial operations. If a risk of splashing exists, wear goggles and face shield.

8.2.1.5 Skin protection: Consult your industrial hygienist or safety manager for the selection of personal protective equipment suitable for the working conditions.

8.3 Other precautions:

- An eyewash and safety shower should be nearby and ready for use.
- Use good hygiene practices when handling this product including changing work clothes after use.
- Do not eat, drink or smoke in areas where this material is handled.

8.4 Other information: The National Transportation Safety Board (NTSB) and Federal Aviation Administration (FAA) have requested the following information be provided:

Completely submerge hydrogen peroxide contaminated clothing or other materials in water prior to drying. Residual hydrogen peroxide, if allowed to dry on materials such as paper, fabrics, cotton, leather, wood or other combustibles can cause the material to ignite and result in a fire.

9. Physical and Chemical Properties

9.1 Appearance: Colorless liquid

Odor: Slightly pungent

9.2 Important Health, Safety and Environmental information:

pH: 1-4

Change of state:

Melting point: -33°C (-27°F) for 35% hydrogen peroxide
-52°C (-62°F) for 50% hydrogen peroxide

Boiling point: 108°C (226°F) @ 1.013 bar (760 mmHg) for 35% hydrogen peroxide
115°C (239°F) @ 1.013 bar (760 mmHg) for 50% hydrogen peroxide

Decompositon Temperature:
$\geq$ 60°C (140°F) Self-accelerated decomposition temperature (SADT) with oxygen release

Flash Point: Non-Flammable

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Hydrogen Peroxide 20-60%

Material Safety Data Sheet; H_2O_2-2060

11. Toxicological Information

11.1 Acute toxicity:

Inhalation:

- Inhalation, LC_{50} , 4 hours, rat, 2000 mg/m³
- Inhalation, LC_0 , 1 hour, mouse, 2170 mg/m³

Oral:

- Oral route, LD_{50}, rat, 1232 mg/kg for 35% hydrogen peroxide
- Oral route, LD_{50}, rat, 841 mg/kg for 60% hydrogen peroxide

Dermal: Dermal route, LD_{50}, rabbit, > 2000 mg/kg for 35% hydrogen peroxide

Irritation:

- Rabbit, Serious damage (eyes) for 70% hydrogen peroxide
- Rabbit, Irritant (skin) for < 50% hydrogen peroxide
- Rabbit, Corrosive (skin) 1 hour, for 50% hydrogen peroxide
- Mouse, Respiratory irritation (RD_{50}), 665 mg/m³

Sensitization: Guinea Pig, Nonsensitizing (skin).

Comments:

- Toxic effect linked with corrosive properties.
- The carcinogenic effect found in animals is not demonstrated in humans

11.2 Chronic toxicity:

- In vitro, without metabolic activation, mutagenic effect.
- In vivo, no mutagenic effect.
- Oral route, after prolonged exposure, mouse.
- Target organ: duodenum, carcinogenic effect.
- Dermal route, after prolonged exposure, mouse, no carcinogenic effect.
- Oral route, after prolonged exposure, rat, no carcinogenic effect.
- Oral route, after prolonged exposure, rat/mouse.
- Target organ: gastro-intestinal system, observed effect.
- Inhalation, after repeated exposure, dog, 7 ppm, irritating effect.

11.3 Carcinogenic Designation:

- IARC (International Agency for Research on Cancer): 3 - Not Classifiable as to Carcinogenicity to Humans.
- TLV A3 - Animal carcinogen: Agent is carcinogenic in experimental animals at relatively high dose, by route(s) of administration, at site(s), of histologic types(s), or by mechanism(s) not considered relevant to worker exposure. Available epidemiologic studies do not confirm an increased risk of cancer in exposed humans. Available evidence suggests that the agent is not likely to cause cancer in humans except under uncommon or unlikely routes or levels of exposure.

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Hydrogen Peroxide 20-60%

Material Safety Data Sheet; H_2O_2-2060

14. Transport Information

Mode	DOT	IMDG	IATA
UN Number	UN 2014	UN 2014	UN 2014
Class (Subsidiary)	5.1(8)	5.1(8)	5.1(8)
Proper Shipping Name	Hydrogen Peroxide, aqueous solution	Hydrogen Peroxide, aqueous solution	Hydrogen Peroxide, aqueous solution
Hazard label (Subsidiary)	Oxidizer (Corrosive)	Oxidizing Agent + Corrosive	Oxidizer + Corrosive
Marine Pollutant	No	No	No
Placard (Subsidiary)	Oxidizer (5.1) [Corrosive (8)]	2014	
Packing Group	II	II	II
Reportable Quantity	100 lbs.		
MFAG			
Emergency Info	ERG 140	EmS 5.1-02	ERG Code 5C
Other			Forbidden over 40%

15. Regulatory Information

National Regulations (US)

TSCA Inventory 8(b): Yes

SARA Title III Sec. 302/303 Extremely Hazardous Substances (40 CFR355): Yes,> 52 % H_2O_2

- Reportable quantity - 1,000 lbs.
- Threshold planning quantity - 1,000 lbs.

SARA Title III Sec. 311/312 (40 CFR 370:

Hazard Category Yes,	• Immediate (acute) Health hazard, Fire Hazard
> 52 % H_2O_2	• Threshold planning quantity - 500 lbs
Yes,< 52 % H_2O_2	• Threshold planning quantity - 10,000 lbs

SARA Title III Sec. 313 Toxic Chemical Emissions Reporting (40 CFR 372): No

CERCLA Hazardous Substance (40CFR Part 302)

Listed: No
Unlisted Substance: Yes, Reportable Quantity 100 lbs
Characteristic: Ignitability (D001), Corrosivity (D002)

Other: Occupational Safety and Health Administration (OSHA) requirements for **process safety management** must be followed anytime at least 7,500 lbs. of hydrogen peroxide at concentrations of at least 52% are used or stored. Refer to **29 CFR 1910.119** for specific details.

State Component Listing:
State Comment: No Data.

National Regulations (Canada) Canadian DSL Registration: Non Confidential #6754

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Material Safety Data Sheet

Oxi 2

3	HMIS HEALTH
0	HMIS FLAMMABILITY
0	HMIS REACTIVITY
C	HMIS PERSONAL PROTECTION

COMPANY & PRODUCT IDENTIFICATION

Company Name	**CHEMICO** INTERNATIONAL, INC. 4801 BALDWIN BLVD. SUITE 200, CORPUS CHRISTI, TX 78408
Phone Number	(361) 883-8255
Effective Date	February 01, 2002
Trade Name	Oxi 2
Chemical Formula	Proprietary Blend

COMPONENTS

Components:	Organic Acid	15 – 30% wt.
	Inorganic Salt	15 – 30%
	Water	40 – 70 %

HEALTH HAZARD DATA

Potential Health Effects: This compound may cause burns and ulceration of the eyes, and is a severe skin irritant. Prolonged exposure may cause skin burns and ulceration. Inhalation may cause nose, throat, and lung irritation. Ingestion may cause burns and/or perforation of the gastrointestinal tract.
Gross overexposure may result in death.
Human Health Effects: Eye contact may cause eye corrosion with corneal or conjunctival ulceration. Skin contact may cause skin irritation with discomfort or rash. Higher or prolonged skin irritation may cause burns or ulceration. Inhalation may cause irritation of the respiratory passages with cough, difficulty in breathing and bronchial irritation. Ingestion may cause irritation of the gastrointestinal tract with abdominal pain, nausea, vomiting, diarrhea, and abnormal kidney function. Ingestion may also cause corrosion of mucous membranes with stomach discomfort, nausea, and prostration. Individuals with preexisting diseases of the skin, kidneys, or reproductive system may have increased susceptibility to the toxicity of excessive exposure.
Carcinogenicity Information: None of the components present in this material at concentrations equal to or greater than 0.1% are listed by IARC, NTP, OSHA, or ACGIH as a carcinogen.

FIRST AID MEASURES

First Aid: Eye Contact - Immediately flush eyes with plenty of water for at least 15 minutes. Call a physician.

Skin Contact - Immediately flush with plenty of water for at least 15 minutes while removing contaminated clothing and shoes. Call a physician. Wash clothing before reuse.

Inhalation - Remove to fresh air immediately. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.

Ingestion - Do not induce vomiting. Give large quantities of water. Call a physician. Never give anything by mouth to an unconscious person.

FIRE FIGHTING MEASURES

Flammable Properties: Will not burn.
Fire and Explosion Hazards: Contact with active metals may produce hydrogen gas.
Extinguishing Media: As appropriate for combustibles in area.

At a high dietary level, a reduced number of offspring were observed in rats, but this effect occurred only at a maternally toxic dose. In a developmental toxicity study, fetal abnormalities were indicated in rats orally dosed during gestation with Oxi 2 at levels that also produced maternal toxicity. The compound does not produce genetic damage in bacteria cell cultures.

ECOLOGICAL INFORMATION

Ecotoxicological Information: Aquatic Toxicity - Slight
24-48 hour LC50, bluegill sunfish: 93mg/L
96 hour LC50, fathead minnows: 164 mg/L
These data indicate that Oxi 2 has slight aquatic toxicity.
Biodegradability - Readily biodegradable. After 7 days, 89.6% is biodegraded (closed bottle test).

DISPOSAL CONSIDERATIONS

Waste Disposal: Comply with Federal, State, local regulations. If approved, may be neutralized with lime or soda ash and flushed to wastewater treatment system. This material may be a RCRA hazardous waste due to its corrosive characteristic (pH).

TRANSPORTATION INFORMATION

Shipping Information: DOT/IMO
Proper Shipping name: Corrosive Liquids, Acidic, Organic, N.O.S.
Hazard Class: 8 UN #: 3265
DOT/IMO: Corrosive Packing Group: II
Shipping Containers: 5 gallon Pails, Drums, Bulk

REGULATORY INFORMATION

U.S. Federal Regulations: TSCA Inventory Status Reported/Included
Title III Hazardous Classifications sections 311, 312

Acute:	Yes	Chronic:	No
Fire:	No	Reactivity:	No
Pressure:	No		

LISTS: SARA Extremely Hazardous Substance - No
CERCLA Hazardous Substance: Yes (see disposal section)
SARA Toxic Chemical: No
CANADIAN WHMIS CLASSIFICATION: E

REGULATORY INFORMATION

NFPA, NPCA-HMIS: NPCA - Rating: Health 3
Flammability 0 Reactivity 0
Personal Protection rating to be supplied by user depending on use conditions.
Additional Information: Do not use this product in personal care applications due to the high level of impurities.
This product's health and safety information is provided to assist our customers in assessing compliance with Health, Safety and Environmental regulations. The information contained herein is based on data available to us, and is believed to be accurate, although no guarantee or warranty is provided or implied by the company in this respect. Since the use of this product is within the exclusive control of the user, it is the user's responsibility to determine the conditions of safe use. Such conditions must comply with all governmental regulations.

WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO SKIN, EYES AND RESPIRATORY TRACT. AFFECTS THE LIVER.

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

Health Rating: 1 - Slight
Flammability Rating: 0 - None
Reactivity Rating: 0 - None
Contact Rating: 0 - None
Lab Protective Equip: GOGGLES; LAB COAT
Storage Color Code: Orange (General Storage)

Potential Health Effects

Inhalation:
Causes irritation to the respiratory tract. Symptoms may include coughing, shortness of breath.
Ingestion:
Low toxicity in small quantities but larger dosages may cause nausea, vomiting, diarrhea, and black stool. Pink urine discoloration is a strong indicator of iron poisoning. Liver damage, coma, and death from iron poisoning has been recorded. Smaller doses are much more toxic to children.
Skin Contact:
Causes irritation to skin. Symptoms include redness, itching, and pain.
Eye Contact:
Causes irritation, redness, and pain.
Chronic Exposure:
Severe or chronic ferrous sulfate poisonings may damage blood vessels. Large chronic doses cause rickets in infants. Chronic exposure may cause liver effects. Prolonged exposure of the eyes may cause discoloration.
Aggravation of Pre-existing Conditions:
Persons with pre-existing skin disorders or eye problems, or impaired liver, kidney or respiratory function may be more susceptible to the effects of the substance.

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4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Get medical attention.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Get medical attention.
Skin Contact:
Immediately flush skin with plenty of soap and water for at least 15 minutes. Remove contaminated clothing and shoes. Get medical attention. Wash clothing before reuse. Thoroughly clean shoes before reuse.

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

Personal Respirators (NIOSH Approved):

If the exposure limit is exceeded and engineering controls are not feasible, a half facepiece particulate respirator (NIOSH type N95 or better filters) may be worn for up to ten times the exposure limit or the maximum use concentration specified by the appropriate regulatory agency or respirator supplier, whichever is lowest.. A full-face piece particulate respirator (NIOSH type N100 filters) may be worn up to 50 times the exposure limit, or the maximum use concentration specified by the appropriate regulatory agency, or respirator supplier, whichever is lowest. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-facepiece positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.

Skin Protection:

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

Eye Protection:

Use chemical safety goggles and/or full face shield where dusting or splashing of solutions is possible. Maintain eye wash fountain and quick-drench facilities in work area.

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9. Physical and Chemical Properties

Appearance:
Blue green crystals.

Odor:
Odorless.

Solubility:
48.6 g/100 g water @ 50C (122F)

Density:
1.90

pH:
No information found.

% Volatiles by volume @ 21C (70F):
0

Boiling Point:
> 300C (> 572F) Decomposes.

Melting Point:
57C (135F) Loses water

Vapor Density (Air=1):
No information found.

Vapor Pressure (mm Hg):
No information found.

Evaporation Rate (BuAc=1):
No information found.

14. Transport Information

Not regulated.

15. Regulatory Information

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

Ingredient	TSCA	EC	Japan	Australia
Ferrous Sulfate (7720-78-7)	Yes	Yes	Yes	Yes

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

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Ferrous Sulfate (7720-78-7)	Yes	Yes	No	Yes

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

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Ferrous Sulfate (7720-78-7)	No	No	No	No

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

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Ferrous Sulfate (7720-78-7)	1000	No	No

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

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

16. Other Information

NFPA Ratings: Health: **1** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED OR INHALED. CAUSES IRRITATION TO

Material Data Safety Sheet (MSDS): SULFURIC ACID

1. Product Identification	7. Handling and Storage
2. Composition	8. Exposure Controls/Personal Protection
3. Hazards Identification	9. Physical and Chemical Properties
4. First Aid Measures	10. Stability and Reactivity
5. Fire Fighting Measures	11. Toxicological Information
6. Accidental Release Measures	12. Ecological Information
	13. Disposal Considerations
	16. Other Information

Note: This information sheet has been re-formatted for better clarity by the Department of Earth Sciences.
Some of the data such as information on shipping and weapons treaties were intentionally left out. If you want to look at the complete MSDS, you can either check one of the hardcopy versions in the Department,
contact the manufacturer, or check one of the various Web-based databases such as those compiled by BU's Office of Environmental Health & Safety (www.bu.edu/ehs/msds/index.htm).
Return to MSDS Index

1. Product Identification

MSDS Name: **Sulfuric acid**, reagent acs

Synonyms: Hydrogen Sulfate, Oil of Vitriol, Vitriol Brown Oil, Matting Acid, Battery Acid
Company Identification: Acros Organics N.V.
One Reagent Lane
Fairlawn, NJ 07410
For information in North America, call: 800-ACROS-01
For emergencies in the US, call CHEMTREC: 800-424-9300

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2. Composition/Information on Ingredients

CAS#	Chemical Name	%	EINECS#

anything by mouth to an unconscious person. Get medical aid immediately.
Inhalation:
Get medical aid immediately. Remove from exposure to fresh air immediately. If breathing is difficult, give oxygen.
Notes to Physician:
Treat symptomatically and supportively.

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5. Fire Fighting Measures

General Information:
Wear appropriate protective clothing to prevent contact with skin and eyes. Wear a self-contained breathing apparatus (SCBA) to prevent contact with thermal decomposition products. Contact with water can cause violent liberation of heat and splattering of the material.
Extinguishing Media:
Do NOT use water directly on fire. Use water spray to cool fire-exposed containers. Use carbon dioxide or dry chemical.
Autoignition Temperature: Not available.
Flash Point: 340 deg C (644.00 deg F)
NFPA Rating: Not published.
Explosion Limits, Lower: Not available.
Upper: Not available.

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6. Accidental Release Measures

General Information: Use proper personal protective equipment as indicated in Section 8.

Spills/Leaks:
Cover with sand, dry lime or soda ash and place in a closed container for disposal.

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7. Handling and Storage

Handling:
Wash thoroughly after handling. Remove contaminated clothing and wash before reuse. Use only in a well ventilated area. Do not get in eyes, on skin, or on clothing. Keep container tightly closed. Do not

9. Physical and Chemical Properties ()

Appearance:	colorless to brown liquid
Odor:	Odorless
Solubility:	
Density:	1.8400 g/cm3
pH:	Not available
% Volatiles by volume @ 21C (70F):	
Boiling Point:	280 deg C @ 760.00mm Hg
Melting Point:	3 deg C
Vapor Density (Air=1):	1.2 kg/m3
Vapor Pressure (mm Hg):	< 0.00120 mm Hg
Evaporation Rate:	Slower than ether
Viscosity:	Not available

Molecular Formula: H2O4S
Molecular Weight: 98.08

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10. Stability and Reactivity

Chemical Stability:
Stable under normal temperatures and pressures.

Conditions to Avoid:
Contact with water, metals, excess heat, combustible materials, organic materials.

Incompatibilities with Other Materials:
Acids (mineral, oxidizing, e.g. chromic acid, hypochlorous acid, nitric acid, sulfuric acid), alcohols and glycols (e.g. butyl alcohol, ethanol, methanol, ethylene glycol), aldehydes (e.g. acetaldehyde, acrolein, chloral hydrate, formaldehyde), amines (aliphatic and aromatic, e.g. dimethyl amine, propylamine, pyridine, triethylamine), azo, diazo, and hydrazines (e.g. dimethyl hydrazine, hydrazine, methyl hydrazine), caustics (e.g. ammonia, ammonium hydrozide, calcium hydroxide, potassium hydroxide, sodium hydroxide), cyanides (e.g. potassium cyanide, sodium cyanide), dithiocarbamates (e.g. ferbam, maneb, metham, thiram), fluorides (inorganic, e.g. ammonium fluoride, calcium fluoride, cesium fluoride), isocyanates (e.g. methyl isocyanate), metals (alkali and alkaline, e.g. cesium, potassium, sodium), metals as powders (e.g. hafnium, raney nickel), metals and metal compounds (toxic, e.g. beryllium, lead acetate, nickel carbonyl, tetraethyl lead), nitrides (e.g. potassium nitride, sodium n.

Hazardous Decomposition Products:

Sulfuric acid is harmful to aquatic life in very low concentrations. It may be dangerous if it enters water intakes. The aquatic toxicity for bluegill in fresh water was 24.5 ppm/24 hr, which was lethal.
Environmental Fate:
Not available.
Physical/Chemical:
Not available.
Other:
Not available.

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13. Disposal Considerations

Dispose of in a manner consistent with federal, state, and local regulations.
RCRA D-Series Maximum Concentration of Contaminants: None listed.
RCRA D-Series Chronic Toxicity Reference Levels: None listed.
RCRA F-Series: None listed.
RCRA P-Series: None listed.
RCRA U-Series: None listed.

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16. Other Information

MSDS Creation Date: 2/01/1996 Revision #3 Date: 10/01/1997

The information above is believed to be accurate and represents the best information currently available to us. However, we make no warranty of merchantability or any other warranty, express or implied, with respect to such information, and we assume no liability resulting from its use. Users should make their own investigations to determine the suitability of the information for their particular purposes. In no way shall Fisher be liable for any claims, losses, or damages of any third party or for lost profits or any special, indirect, incidental, consequential or exemplary damages, howsoever arising, even if Fisher has been advised of the possibility of such damages.

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VI. HEALTH HAZARD DATA

Route(s) of Entry:	Inhalation? Yes Skin? No Ingestion? Yes
Health Hazards (Acute and Chronic):	Inhalation of powder may prove locally irritating to mucous membranes. Ingestion may cause discomfort and/or diarrhea. Eye contact may prove irritating.
Carcinogenicity:	NTP? No IARC Monographs? No OSHA Regulated? No
Signs and Symptoms of Exposure:	Exposure may irritate mucous membranes. May cause sneezing.
Medical Conditions Generally Aggravated by Exposure:	Not established. Unnecessary exposure to this product or any industrial chemical should be avoided. Respiratory conditions may be aggravated by powder.
Emergency and First Aid Procedures:	Eyes: Immediately flush eyes with water for at least 15 minutes. Call a physician. Skin: Flush with plenty of water. Ingestion: Drink large quantities of water or milk. Do not induce vomiting. If vomiting occurs administer fluids. See a physician for discomfort.

VII. PRECAUTIONS FOR SAFE HANDLING AND USE

Steps to be Taken if Material is Released or Spilled:	Material foams profusely. Recover as much as possible and flush remainder to sewer. Material is biodegradable.
Waste Disposal Method:	Small quantities may be disposed of in sewer. Large quantities should be disposed of in accordance with local ordinances for detergent products.
Precautions to be Taken in Storing and Handling:	Material should be stored 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.

VIII. CONTROL MEASURES

Respiratory Protection (Specify Type):	Dust mask - Recommended
Ventilation:	Local Exhaust-Normal Special-Not Required Mechanical-Not Required Other-Not Required
Protective Gloves:	Impervious gloves are useful but not required.
Eye Protection:	Goggles are recommended when handling solutions.
Other Protective Clothing or Equipment:	None
Work/Hygienic Practices:	No special practices required

THE INFORMATION HEREIN IS GIVEN IN GOOD FAITH BUT NO WARRANTY IS EXPRESSED OR IMPLIED.

Date Issued 20,1995 Revised November 15,1995

V. HEALTH HAZARD DATA

Threshold Limit Value:	OSHA Threshold Limit Value	ACGIH Threshold Limit Value
8 hr. TWA 1 mg/m as Fe		TLV 1 mg/m as Fe

Symptoms of Exposure:
EXCESSIVE INHALATION OF DUST OR SOLUTION MIST IS IRRITATING TO THE RESPIRATORY TRACT. EYE CONTACT IS IRRITATING AND CAN BE DAMAGING. FERROUS SULFATE IS LOW IN TOXICITY (USED IN IRON NUTRIENT IN ANIMAL FEED) BUT INGESTION OF HUGE QUANTITIES CAN PRODUCE GI TRACT DISTURBANCES, SEVERE SHOCK, VOMITING, LIVER DAMAGE, TACHYCARDIA, AND EVEN DEATH (SOMETIMES AS MUCH AS THREE DAYS DELAYED).

Emergency First Aid:
IF EYES OR SKIN ARE IRRITATED, WASH WITH WATER AND SALT SOLUTION. IF IRRITATION PERSISTS OR IF INGESTED ACCIDENTALLY, SEE A PHYSICIAN AT ONCE. IF INGESTED, RINSE MOUTH WITH WATER, DRINK LOTS OF WATER, AND CONSULT A PHYSICIAN. IF INHALED SEEK FRESH AIR, SEEK MEDICAL HELP IS IRRITATION CONTINUES.

VI. REACTIVITY DATA

Stability: FERROUS SULFATE IS STABLE
HAZARDOUS POLYMERIZATION WILL NOT OCCUR
Conditions to Avoid:
DO NOT STORE ON OPEN CONTAINERS OR IN HIGH HUMIDITY OR HIGH TEMPERATURE. THESE CONDITIONS WILL CAUSE AN OXIDATION TO FERRIC SULFATE.
Materials to Avoid:
ALKALIS, SOLUBLE CARBONATES AND OXIDIZING AGENTS.

VII. ENVIRONMENTAL PROTECTION PROCEDURES

Spill Response and Waste Disposal Method:
AVOID CREATING DUST. SCOOP UP SPILLED SOLIDS FOR RECOVERY OR DISPOSAL. THOSE INVOLVED IN CLEANUP NEED PROTECTION FROM INHALATION AND SKIN CONTACT. TRACE RESIDUES MAY BE FLUSHED WITH WATER, BUT DO NOT SEND THIS SOLUBLE IRON COMPOUND TO SEWERS OR WATERWAYS WITHOUT TREATMENT. RECOVER SPILLED SOLUTIONS FOR TREATMENT. TREAT WATER SOLUTION OF SCRAP MATERIAL WITH SODA ASH OR DILUTE SODIUM HYDROXIDE TO PRECIPITATE IRON. SEPARATE THE PRECIPITATE AND DISPOSE OF IN AN APPROVED LANDFILL. NEUTRALIZE THE CLEAR REMAINING LIQUID WITH DILUTE ACID BEFORE FLUSHING TO SEWER.

VIII. SPECIAL PROTECTION INFORMATION

Eye Protection:	GOGGLES
Respiratory Protection:	DUST MASK (3M #8710)
Skin Protection:	LONG SLEEVES, APRON, RUBBER GLOVES
Ventilation Recommended:	YES
Other Protection:	EYEWASH STATION AND SAFETY SHOWER SHOULD BE READILY AVAILABLE WHERE THIS MATERIAL IS IN USE.

IX. SPECIAL PRECAUTIONS

Hygienic Practices in Handling and Storage: STORE IN WELL CLOSED CONTAINERS IN A COOL, DRY AREA AWAY FROM ALKALINE MATERIALS AND OXIDIZING AGENTS.
FORM #048

Ingestion: Causes gastrointestinal irritation with nausea, vomiting and diarrhea. Causes gastrointestinal tract burns. May cause vascular collapse and damage. May cause damage to the red blood cells. May cause difficulty in swallowing, stomach distension, possible cerebral swelling and death. Ingestion may result in irritation of the esophagus, bleeding of the stomach and ulcer formation.
Inhalation: Causes chemical burns to the respiratory tract. May cause ulceration of nasal tissue, insomnia, nervous tremors with numb extremities, chemical pneumonia, unconsciousness, and death. At high concentrations, respiratory effects may include acute lung damage and delayed pulmonary edema.
Chronic: Prolonged or repeated skin contact may cause dermatitis. Laboratory experiments have resulted in mutagenic effects. Repeated contact may cause corneal damage.

Section 4 - First Aid Measures

Eyes: Get medical aid immediately. Do NOT allow victim to rub or keep eyes closed. Extensive irrigation with water is required (at least 30 minutes).
Skin: Get medical aid immediately. Immediately flush skin with plenty of soap and water for at least 15 minutes while removing contaminated clothing and shoes. Wash clothing before reuse. Destroy contaminated shoes.
Ingestion: Do NOT induce vomiting. If victim is conscious and alert, give 2-4 cupfuls of milk or water. Never give anything by mouth to an unconscious person. Get medical aid immediately. Wash mouth out with water. Vomiting may occur spontaneously. If vomiting occurs and the victim is conscious, give water to further dilute the chemical.
Inhalation: Get medical aid immediately. Remove from exposure to fresh air immediately. If breathing is difficult, give oxygen. Do NOT use mouth-to-mouth resuscitation. If breathing has ceased apply artificial respiration using oxygen and a suitable mechanical device such as a bag and a mask.
Notes to Physician: Treat symptomatically and supportively. Attempts at evacuating the stomach via emesis induction or gastric lavage should be avoided. In the event of severe distension of the stomach or esophagus due to gas formation, insertion of a gastric tube may be required. To treat corneal damage, careful ophthalmologic evaluation is recommended and the possibility of local corticosteroid therapy should be considered.

Section 5 - Fire Fighting Measures

General Information: As in any fire, wear a self-contained breathing apparatus in pressure-demand, MSHA/NIOSH (approved or equivalent), and full protective gear. Water runoff can cause environmental damage. Dike and collect water used to fight fire. Strong oxidizer. Contact with combustible materials may cause a fire. During a fire, irritating and highly toxic gases may be generated by thermal decomposition or combustion. Use water spray to keep fire-exposed containers cool. Substance is noncombustible. Use water with caution and in flooding amounts. Vapors may be heavier than air. They can spread along the ground and collect in low or confined areas. Some oxidizers may react explosively with hydrocarbons(fuel). May decompose explosively when heated or involved in a fire. May accelerate burning if involved in a fire.
Extinguishing Media: Use water only! Do NOT use carbon dioxide. Do NOT use dry chemical. Do NOT get water inside containers. Contact professional fire-fighters immediately. Cool containers with flooding quantities of water until well after fire is out. For large fires, flood fire area with large quantities of water, while knocking down vapors with water fog.

Section 9 - Physical and Chemical Properties

Physical State: Liquid
Appearance: clear, colorless
Odor: slight acid odor
pH: 3.3 (30% solution)
Vapor Pressure: 23 mm Hg @ 30C
Vapor Density: 1.10
Evaporation Rate:>1.0 (Butyl acetate=1)
Viscosity: 1.25 cP
Boiling Point: 108 deg C @ 760 mmHg
Freezing/Melting Point:-33 deg C
Autoignition Temperature: Noncombustible
Flash Point: Noncombustible
Decomposition Temperature: Not available.
NFPA Rating: (estimated) Health: 3; Flammability: 0; Reactivity: 1
Explosion Limits, Lower:40 vol %
Upper: 100 vol %
Solubility: Miscible in water.
Specific Gravity/Density:1.1-1.2 (30-50%)
Molecular Formula:H2O2
Molecular Weight:34.0128

Section 10 - Stability and Reactivity

Chemical Stability: Decomposes slowly to release oxygen. Unstable when heated or contaminated with heavy metals, reducing agents, rust, dirt or organic materials. Stability is reduced when pH is above 4.0.
Conditions to Avoid: Mechanical shock, incompatible materials, light, ignition sources, dust generation, excess heat, combustible materials, reducing agents, alkaline materials, strong oxidants, rust, dust, pH > 4.0.
Incompatibilities with Other Materials: Strong oxidizing agents, strong reducing agents, acetic acid, acetic anhydride, alcohols, brass, copper, copper alloys, finely powdered metals, galvanized iron, hydrazine, iron, magnesium, nitric acid, sodium carbonate, potassium permanganate, cyanides (e.g. potassium cyanide, sodium cyanide), ethers (e.g. dioxane, furfuran, tetrahydrofuran (THF)), urea, chlorosulfonic acid, alkalies, lead, nitrogen compounds, triethylamine, silver, nickel, palladium, organic matter, charcoal, sodium borate, aniline, platinum, formic acid, cyclopentadiene, activated carbon, tert-butyl alcohol, hydrogen selenide, manganese dioxide, mercurous chloride, rust, ketones, carboxylic acids, glycerine, sodium fluoride, sodium pyrophosphate, soluble fuels (acetone, ethanol, glycerol), wood, wood, asbestos, hexavalent chromium compounds, salts of iron, copper, chromium, vanadium, tungsten, molybdeum, and platinum.
Hazardous Decomposition Products: Oxygen, hydrogen gas, water, heat, steam.
Hazardous Polymerization: Will not occur.

Section 11 - Toxicological Information

RTECS#:
CAS# 7722-84-1: MX0887000; MX0890000; MX0899000; MX0899500; MX0900000

Section 14 - Transport Information

	US DOT	IATA	RID/ADR	IMO	Canada TDG
Shipping Name:	HYDROGEN PEROXIDE, AQUEOUS SOLUTIONS 30%				HYDROGEN PEROXIDE
Hazard Class:	5.1				5.1(8)
UN Number:	UN2014				UN2014
Packing Group:	II				II

Section 15 - Regulatory Information

US FEDERAL

TSCA
CAS# 7722-84-1 is listed on the TSCA inventory.
CAS# 7732-18-5 is listed on the TSCA inventory.
Health & Safety Reporting List
None of the chemicals are on the Health & Safety Reporting List.
Chemical Test Rules
None of the chemicals in this product are under a Chemical Test Rule.
Section 12b
None of the chemicals are listed under TSCA Section 12b.
TSCA Significant New Use Rule
None of the chemicals in this material have a SNUR under TSCA.
SARA

Section 302 (RQ)
None of the chemicals in this material have an RQ.
Section 302 (TPQ)
CAS# 7722-84-1: concentration > 52%: TPQ = 1000 pounds; RQ = 1000 poun ds
SARA Codes
CAS # 7722-84-1: acute, flammable.
Section 313
No chemicals are reportable under Section 313.
Clean Air Act:
This material does not contain any hazardous air pollutants. This material does not contain any Class 1 Ozone depletors. This material does not contain any Class 2 Ozone depletors.
Clean Water Act:
None of the chemicals in this product are listed as Hazardous Substances under the CWA. None of the chemicals in this product are listed as Priority Pollutants under the CWA. None of the chemicals in this product are listed as Toxic Pollutants under the CWA.
OSHA:
CAS# 7722-84-1 is considered highly hazardous by OSHA.
STATE
CAS# 7722-84-1 can be found on the following state right to know lists: California, New Jersey, Florida, Pennsylvania, Minnesota, Massachusetts.
CAS# 7732-18-5 is not present on state lists from CA, PA, MN, MA, FL, or NJ.
California No Significant Risk Level: None of the chemicals in this product are listed.

OWEN COMPLIANCE SERVICES, INC.

Material Safety Data Sheet
(MSDS-HCL)

PRODUCT IDENTIFICATION	
Product Name	Hydrochloric Acid Solution 20 Deg. Be – 31.5% 22 Deg. Be – 35.2%
Trade Names and Synonyms	Hydrogen Chloride (Aqueous) Muriatic Acid
Manufacturer/Distributor	Trans Chem, Inc. 1415 Mengel Road Baton Rouge, Louisiana 70807 (504) 355-9977 Various others
Transportation Emergency	**800-255-3924 (24 hrs -- *CHEM • TEL*)**

HAZARDOUS COMPONENTS			
Material or Component	**CAS No.**	**TLV**	**PEL**
Hydrochloric Acid	7647-01-0	7mg/m^3	5PPM
N/A = Not assigned NE = Not established			

PHYSICAL DATA	
Boiling Point	127° F
Vapor Pressure	24mm Hg – 20 Deg. Be 100mm Hg – 22 Deg. Be
Solubility in Water	Complete
Specific Gravity	1.16 @ 15.5° C 20 Deg. Be 1.1789 @ 15.5° C 22 Deg. Be
Melting Point	N/A
Vapor Density	Similar to Water
Evaporation Rate	Not Applicable
Appearance and Odor	Clear Colorless to Yellowish Fuming Liquid, Pungent and Irritating

HAZARDOUS REACTIVITY
Stable under ordinary conditions of use and storage. Does not polymerize. Incompatible with aluminum and aluminum alloys, carbon steel, copper and copper alloys, and nylon. Hydrogen gas will be formed if acid contacts metal.

FIRE AND EXPLOSION DATA	
Flashpoint	Not Flammable
Extinguishing Media	Use any means suitable for extinguishing surrounding fire.
Decomposition Products	Contact with most metals may produce Hydrogen gas to potentially explosive limits.
Unusnal Explosion	Containers may explode when heated. Consult the 2000 Emergency Response Guidebook, Guide 157 for further details.

The information contained in this Material Safety Data Sheet is based upon available data and believed to be correct; however, as such has been obtained from various sources, including the manufacturer and independent laboratories, it is given without warranty or representation that it is complete, accurate, and can be relied upon. *Owen Compliance Services, Inc.* has not attempted to conceal in any manner the deleterious aspects of the product listed herein, but makes no warranty as to such. Further, *Owen Compliance Services, Inc.* cannot anticipate nor control the many situations in which the product or this information may be used; there is no guarantee that the health and safety precautions suggested will be proper under all conditions. It is the sole responsibility of each user of the product to determine and comply with the requirements of all applicable laws and regulations regarding its use. This information is given solely for the purposes of safety to persons and property. Any other use of this Information is expressly prohibited.

For further information contact:

David W. Boston, President
Owen Compliance Services, Inc.
12001 County Road 1000
P.O. Box 765
Godley, TX 76044
Telephone number: 817-551-0660
FAX number: 817-396-4584

MSDS prepared by:

Allen M. Sweeney

Original publication date: 8/5/1999
Revision date 12/03/03

metals is rapid or violent, and generates hydrogen (flammable, explosion hazard).

Toxicology

Extremely corrosive, causes serious burns. Highly toxic. Harmful by inhalation, ingestion and through skin contact. Ingestion may be fatal. Skin contact can lead to extensive and severe burns. Chronic exposure may result in lung damage and possibly cancer.

Toxicity data
(The meaning of any abbreviations which appear in this section is given here.)
IHL-RAT LC50 0.51 mg/l
UNR-MAN LDLO 135 mg kg^{-1}
ORL-RAT LD50 2140 mg kg^{-1} (25% solution)
IHL-MUS LC50 320 mg m^{-3} / 2h
IHL-GPG LC50 18 mg m^{-3}

Risk phrases
(The meaning of any risk phrases which appear in this section is given here.)
R35 R36 R37 R38 R49.

Transport information

(The meaning of any UN hazard codes which appear in this section is given here.)
UN No 1830. IMDG class 8. Packing group II. IATA 1830. UK transport category 2.

Personal protection

Safety glasses or face mask; acid-resistant gloves. Suitable ventilation. In the UK use of this material must be assessed under the COSHH regulations.

Safety phrases
(The meaning of any safety phrases which appear in this section is given here.)
S23 S30 S36 S37 S39 S45.

[Return to Physical & Theoretical Chemistry Lab. Safety home page.]

This information was last updated on February 11, 2004. Although we have tried to make it as accurate and useful as possible, we can take no responsibility for its use or misuse.

MSDS Number: **P5587** * * * * * *Effective Date:* ***02/12/04*** * * * * * *Supercedes:* ***06/06/01***

MSDS **Material Safety Data Sheet**

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

Mallinckrodt CHEMICALS J.T.Baker

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

National Response in Canada
CANUTEC: 613-996-6666

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

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

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

POTASSIUM BROMIDE

1. Product Identification

Synonyms: Bromide salt of potassium
CAS No.: 7758-02-3
Molecular Weight: 119.00
Chemical Formula: KBr
Product Codes:
J.T. Baker: 2961, 2998
Mallinckrodt: 0493, 0500, 0505

2. Composition/Information on Ingredients

Ingredient	CAS No	Percent	Hazardous
Potassium Bromide	7758-02-3	100%	Yes

3. Hazards Identification

Emergency Overview

WARNING! HARMFUL IF SWALLOWED OR INHALED. AFFECTS CENTRAL NERVOUS SYSTEM, BRAIN AND EYES. MAY CAUSE IRRITATION TO SKIN, EYES, AND RESPIRATORY TRACT.

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

Health Rating: 1 - Slight
Flammability Rating: 0 - None
Reactivity Rating: 0 - None
Contact Rating: 1 - Slight
Lab Protective Equip: GOGGLES; LAB COAT
Storage Color Code: Orange (General Storage)

Potential Health Effects

Inhalation:
Dust may cause irritation to the respiratory tract. Symptoms may include coughing, sore throat, and shortness of breath.
Ingestion:
May cause nausea, vomiting and abdominal pain. Ingestions are usually promptly rejected by vomiting, but sufficient absorption may occur to produce central nervous system, eye and brain effects. Symptoms may include skin rash, blurred vision and other eye effects, drowsiness, irritability, dizziness, mania, hallucinations, and coma.
Skin Contact:
Dry material may cause mild irritation. Solutions may cause irritation, redness, pain, and skin burns.
Eye Contact:
May cause irritation, redness and pain.
Chronic Exposure:
Repeated or prolonged exposure by any route may cause skin rashes (bromaderma). Repeated ingestion of small amounts may cause central nervous system depression, including depression, ataxia, psychoses, memory loss, irritability, and headache.
Aggravation of Pre-existing Conditions:
Persons suffering from debilitation, depression, alcoholism, neurological or psychological disorders may be more susceptible to the effects of this compound.

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4. First Aid Measures

Inhalation:
Remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. Call a physician.
Ingestion:
Induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. Call a physician.
Skin Contact:
In case of contact, immediately flush skin with plenty of water for at least 15 minutes.

Remove contaminated clothing and shoes. Wash clothing before reuse. Call a physician.
Eye Contact:
Wash eyes with plenty of water for at least 15 minutes. Call a physician.

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5. Fire Fighting Measures

Fire:
Not considered to be a fire hazard.
Explosion:
Not considered to be an explosion hazard.
Fire Extinguishing Media:
Use any means suitable for extinguishing surrounding fire.
Special Information:
In the event of a fire, wear full protective clothing and NIOSH-approved self-contained breathing apparatus with full facepiece operated in the pressure demand or other positive pressure mode.

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6. Accidental Release Measures

Ventilate area of leak or spill. Wear appropriate personal protective equipment as specified in Section 8. Spills: Sweep up and containerize for reclamation or disposal. Vacuuming or wet sweeping may be used to avoid dust dispersal.

---

7. Handling and Storage

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

---

8. Exposure Controls/Personal Protection

Airborne Exposure Limits:
None established.
Ventilation System:
A system of local and/or general exhaust is recommended to keep employee exposures as low as possible. Local exhaust ventilation is generally preferred because it can control the emissions of the contaminant at its source, preventing dispersion of it into the general work area. Please refer to the ACGIH document, *Industrial Ventilation, A Manual of*

Recommended Practices, most recent edition, for details.
Personal Respirators (NIOSH Approved):
For conditions of use where exposure to dust or mist is apparent and engineering controls are not feasible, a particulate respirator (NIOSH type N95 or better filters) may be worn. If oil particles (e.g. lubricants, cutting fluids, glycerine, etc.) are present, use a NIOSH type R or P filter. For emergencies or instances where the exposure levels are not known, use a full-face positive-pressure, air-supplied respirator. WARNING: Air-purifying respirators do not protect workers in oxygen-deficient atmospheres.
Skin Protection:
Wear protective gloves and clean body-covering clothing.
Eye Protection:
Use chemical safety goggles. Maintain eye wash fountain and quick-drench facilities in work area.

---

9. Physical and Chemical Properties

Appearance:
White crystals.
Odor:
Odorless.
Solubility:
70g/100g water @ 25C (77F).
Specific Gravity:
2.75 @ 25C
pH:
Aqueous solution is neutral.
% Volatiles by volume @ 21C (70F):
0
Boiling Point:
1435C (2615F)
Melting Point:
730C (1346F)
Vapor Density (Air=1):
No information found.
Vapor Pressure (mm Hg):
No information found.
Evaporation Rate (BuAc=1):
No information found.

---

10. Stability and Reactivity

Stability:
Stable under ordinary conditions of use and storage.
Hazardous Decomposition Products:
Oxides of the contained metal and halogen, possibly also free, or ionic halogen.
Hazardous Polymerization:

Will not occur.
Incompatibilities:
For Potassium Bromide: Strong oxidizers, acids, and bromine trifluoride.
Conditions to Avoid:
Incompatibles.

---

11. Toxicological Information

Potassium bromide: oral rat LD50: 3070 mg/kg; investigated as a mutagen.

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

Ingredient	---NTP Carcinogen--- Known	Anticipated	IARC Category
Potassium Bromide (7758-02-3)	No	No	None

---

12. Ecological Information

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

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13. Disposal Considerations

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

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14. Transport Information

Not regulated.

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15. Regulatory Information

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

Ingredient	TSCA	EC	Japan	Australia
Potassium Bromide (7758-02-3)	Yes	Yes	Yes	Yes

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

Ingredient	Korea	--Canada-- DSL	NDSL	Phil.
Potassium Bromide (7758-02-3)	Yes	Yes	No	Yes

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

Ingredient	-SARA 302- RQ	TPQ	------SARA 313------ List	Chemical Catg.
Potassium Bromide (7758-02-3)	No	No	No	No

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

Ingredient	CERCLA	-RCRA- 261.33	-TSCA- 8(d)
Potassium Bromide (7758-02-3)	No	No	No

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

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

---

16. Other Information

NFPA Ratings: Health: **2** Flammability: **0** Reactivity: **0**
Label Hazard Warning:
WARNING! HARMFUL IF SWALLOWED OR INHALED. AFFECTS CENTRAL NERVOUS SYSTEM, BRAIN AND EYES. MAY CAUSE IRRITATION TO SKIN, EYES, AND RESPIRATORY TRACT.
Label Precautions:
Avoid breathing dust.
Keep container closed.
Use with adequate ventilation.
Avoid contact with eyes, skin and clothing.
Wash thoroughly after handling.
Label First Aid:
If swallowed, induce vomiting immediately as directed by medical personnel. Never give anything by mouth to an unconscious person. If inhaled, remove to fresh air. If not breathing, give artificial respiration. If breathing is difficult, give oxygen. In case of contact,

immediately flush eyes or skin with plenty of water for at least 15 minutes. In all cases call a physician.

Product Use:

Laboratory Reagent.

Revision Information:

No Changes.

Disclaimer:

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

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

APPENDIX C

NIOSH CHEMICAL HAZARD SHEETS

NIOSH Pocket Guide to Chemical Hazards

Hydrogen peroxide	**CAS** 7722-84-1
H_2O_2	**RTECS** MX0900000
Synonyms & Trade Names High-strength hydrogen peroxide, Hydrogen dioxide, Hydrogen peroxide (aqueous), Hydroperoxide, Peroxide	**DOT ID & Guide** 2984 140 (8-20% solution) 2014 140 (20-60% solution) 2015 143 (>60% solution)

Exposure Limits	NIOSH REL: TWA 1 ppm (1.4 mg/m^3)
	OSHA PEL: TWA 1 ppm (1.4 mg/m^3)
IDLH 75 ppm See: 772841	**Conversion** 1 ppm = 1.39 mg/m^3

Physical Description
Colorless liquid with a slightly sharp odor. [Note: The pure compound is a crystalline solid below 12°F. Often used in an aqueous solution.]

MW: 34.0	BP: 286°F	FRZ: 12°F	Sol: Miscible
VP(86°F): 5 mmHg	IP: 10.54 eV		Sp.Gr: 1.39
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid, but a powerful oxidizer.

Incompatibilities & Reactivities
Oxidizable materials, iron, copper, brass, bronze, chromium, zinc, lead, silver, manganese. [Note: Contact with combustible material may result in SPONTANEOUS combustion.]

Measurement Methods
OSHA ID126SG
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Water flush immediately Breathing: Respiratory support Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH/OSHA
Up to 10 ppm: (APF = 10) Any supplied-air respirator*
Up to 25 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*
Up to 50 ppm: (APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Up to 75 ppm: (APF = 2000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted canister providing protection against the compound of concern/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose, throat; corneal ulcer; erythema (skin redness), skin vesiculation; bleaching hair

Target Organs Eyes, skin, respiratory system

See also: INTRODUCTION See ICSC CARD: 0164

NIOSH Pocket Guide to Chemical Hazards

Sulfuric acid	**CAS** 7664-93-9
H_2SO_4	**RTECS** WS5600000
Synonyms & Trade Names Battery acid, Hydrogen sulfate, Oil of vitriol, Sulfuric acid (aqueous)	**DOT ID & Guide** 1830 137 1831 137 (fuming) 1832 137 (spent)

Exposure Limits	NIOSH REL: TWA 1 mg/m^3
	OSHA PEL: TWA 1 mg/m^3
IDLH 15 mg/m^3 See: 7664939	**Conversion**

Physical Description
Colorless to dark-brown, oily, odorless liquid. [Note: Pure compound is a solid below 51°F. Often used in an aqueous solution.]

MW: 98.1	BP: 554°F	FRZ: 51°F	Sol: Miscible
VP: 0.001 mmHg	IP: ?		Sp.Gr: 1.84 (96-98% acid)
Fl.P: NA	UEL: NA	LEL: NA	

Noncombustible Liquid, but capable of igniting finely divided combustible materials.

Incompatibilities & Reactivities
Organic materials, chlorates, carbides, fulminates, water, powdered metals [Note: Reacts violently with water with evolution of heat. Corrosive to metals.]

Measurement Methods
NIOSH 7903; OSHA ID113, ID165SG
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: No recommendation
Provide: Eyewash (>1%), Quick drench (>1%)

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Water flush immediately
Breathing: Respiratory support
Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH/OSHA
Up to 15 mg/m^3: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode£/(APF = 25) Any powered, air-purifying respirator with acid gas cartridge(s) in combination with a high-efficiency particulate filter£
(APF = 50) Any chemical cartridge respirator with a full facepiece and acid gas cartridge(s) in combination with a high-efficiency particulate filter/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted acid gas canister having a high-efficiency particulate filter/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted acid gas canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; pulmonary edema, bronchitis; emphysema; conjunctivitis; stomatis; dental erosion; eye, skin burns; dermatitis

Target Organs Eyes, skin, respiratory system, teeth

See also: INTRODUCTION See ICSC CARD: 0362 See MEDICAL TESTS: 0218

NIOSH Pocket Guide to Chemical Hazards

Iron salts (soluble, as Fe)	CAS
	RTECS
Synonyms & Trade Names $FeSO_4$: Ferrous sulfate, Iron(II) sulfate $FeCl_2$: Ferrous chloride, Iron(II) chloride $Fe(NO_3)_3$: Ferric nitrate, Iron(III) nitrate $Fe(SO_4)_3$: Ferric sulfate, Iron(III) sulfate $FeCl_3$: Ferric chloride, Iron(III) chloride	DOT ID & Guide

Exposure Limits	NIOSH REL: TWA 1 mg/m^3
	OSHA PEL†: none

IDLH N.D. See: IDLH INDEX	Conversion

Physical Description
Appearance and odor vary depending upon the specific soluble iron salt.

Properties vary depending upon the specific soluble iron salt.			
Varies			

Noncombustible Solids

Incompatibilities & Reactivities

Measurement Methods
NIOSH 7300; OSHA ID121, ID125G
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: Daily
Remove: No recommendation
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash
Breathing: Respiratory support
Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations To be added later

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; abdominal pain, diarrhea, vomiting; possible liver damage

Target Organs Eyes, skin, respiratory system, liver, gastrointestinal tract

See also: INTRODUCTION

NIOSH Pocket Guide to Chemical Hazards

Benzene	**CAS** 71-43-2
C_6H_6	**RTECS** CY1400000
Synonyms & Trade Names Benzol, Phenyl hydride	**DOT ID & Guide** 1114 130

Exposure Limits	NIOSH REL: Ca TWA 0.1 ppm ST 1 ppm See Appendix A
	OSHA PEL: [1910.1028] TWA 1 ppm ST 5 ppm See Appendix F
IDLH Ca [500 ppm] See: 71432	**Conversion** 1 ppm = 3.19 mg/m^3

Physical Description
Colorless to light-yellow liquid with an aromatic odor. [Note: A solid below 42°F.]

MW: 78.1	BP: 176°F	FRZ: 42°F	Sol: 0.07%
VP: 75 mmHg	IP: 9.24 eV		Sp.Gr: 0.88
Fl.P: 12°F	UEL: 7.8%	LEL: 1.2%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers, many fluorides & perchlorates, nitric acid

Measurement Methods
NIOSH 1500, 1501, 3700, 3800; OSHA 12, 1005
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet (flammable) Change: No recommendation Provide: Eyewash, Quick drench	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash immediately Breathing: Respiratory support Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH
At concentrations above the NIOSH REL, or where there is no REL, at any detectable concentration: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, respiratory system; dizziness; headache, nausea, staggered gait; anorexia, lassitude (weakness, exhaustion); dermatitis; bone marrow depression; [potential occupational carcinogen]

Target Organs Eyes, skin, respiratory system, blood, central nervous system, bone marrow

Cancer Site [leukemia]

See also: INTRODUCTION See ICSC CARD: 0015 See MEDICAL TESTS: 0022

NIOSH Pocket Guide to Chemical Hazards

Ethyl benzene	**CAS** 100-41-4
$CH_3CH_2C_6H_5$	**RTECS** DA0700000
Synonyms & Trade Names Ethylbenzol, Phenylethane	**DOT ID & Guide** 1175 129

Exposure Limits	NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 125 ppm (545 mg/m^3)
	OSHA PEL†: TWA 100 ppm (435 mg/m^3)

IDLH 800 ppm [10%LEL] See: 100414	**Conversion** 1 ppm = 4.34 mg/m^3

Physical Description
Colorless liquid with an aromatic odor.

MW: 106.2	BP: 277°F	FRZ: -139°F	Sol: 0.01%
VP: 7 mmHg	IP: 8.76 eV		Sp.Gr: 0.87
Fl.P: 55°F	UEL: 6.7%	LEL: 0.8%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1501; OSHA 7, 1002
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Water flush promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH/OSHA
Up to 800 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; headache; dermatitis; narcosis, coma

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0268 See MEDICAL TESTS: 0098

NIOSH Pocket Guide to Chemical Hazards

Cumene	**CAS** 98-82-8
$C_6H_5CH(CH_3)_2$	**RTECS** GR8575000
Synonyms & Trade Names Cumol, Isopropyl benzene, 2-Phenyl propane	**DOT ID & Guide** 1918 130

Exposure Limits	NIOSH REL: TWA 50 ppm (245 mg/m^3) [skin]
	OSHA PEL: TWA 50 ppm (245 mg/m^3) [skin]
IDLH 900 ppm [10%LEL] See: 98828	**Conversion** 1 ppm = 4.92 mg/m^3

Physical Description
Colorless liquid with a sharp, penetrating, aromatic odor.

MW: 120.2	BP: 306°F	FRZ: -141°F	Sol: Insoluble
VP: 8 mmHg	IP: 8.75 eV		Sp.Gr: 0.86
Fl.P: 96°F	UEL: 6.5%	LEL: 0.9%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Oxidizers, nitric acid, sulfur acid [Note: Forms cumene hydroperoxide upon long exposure to air.]

Measurement Methods
NIOSH 1501
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Water flush promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH/OSHA
Up to 500 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*
Up to 900 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s)/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, mucous membrane; dermatitis; headache, narcosis, coma

Target Organs Eyes, skin, respiratory system, central nervous system

See also: INTRODUCTION See ICSC CARD: 0170 See MEDICAL TESTS: 0060

NIOSH Pocket Guide to Chemical Hazards

Naphthalene	**CAS** 91-20-3
$C_{10}H_8$	**RTECS** QJ0525000
Synonyms & Trade Names Naphthalin, Tar camphor, White tar	**DOT ID & Guide** 1334 133 (crude or refined) 2304 133 (molten)

Exposure Limits	NIOSH REL: TWA 10 ppm (50 mg/m^3) ST 15 ppm (75 mg/m^3)
	OSHA PEL†: TWA 10 ppm (50 mg/m^3)
IDLH 250 ppm See: 91203	**Conversion** 1 ppm = 5.24 mg/m^3

Physical Description
Colorless to brown solid with an odor of mothballs. [Note: Shipped as a molten solid.]

MW: 128.2	BP: 424°F	MLT: 176°F	Sol: 0.003%
VP: 0.08 mmHg	IP: 8.12 eV		Sp.Gr: 1.15
Fl.P: 174°F	UEL: 5.9%	LEL: 0.9%	

Combustible Solid, but will take some effort to ignite.

Incompatibilities & Reactivities
Strong oxidizers, chromic anhydride

Measurement Methods
NIOSH 1501; OSHA 35
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: Daily

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Molten flush immediately/solid-liquid soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH/OSHA
Up to 100 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s) in combination with a dust and mist filter*/(APF = 10) Any supplied-air respirator*
Up to 250 ppm: (APF = 25) Any supplied-air respirator operated in a continuous-flow mode*/(APF = 50) Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s) in combination with a high-efficiency particulate filter/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s) in combination with a dust and mist filter*/(APF = 50) Any self-contained breathing apparatus with a full facepiece/(APF = 50) Any supplied-air respirator with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister having a high-efficiency particulate filter/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes; headache, confusion, excitement, malaise (vague feeling of discomfort); nausea, vomiting, abdominal pain; irritation bladder; profuse sweating; jaundice; hematuria (blood in the urine), renal shutdown; dermatitis, optical neuritis, corneal damage

Target Organs Eyes, skin, blood, liver, kidneys, central nervous system

See also: INTRODUCTION See ICSC CARD: 0667 See MEDICAL TESTS: 0152

NIOSH Pocket Guide to Chemical Hazards

1,2,4-Trimethylbenzene	**CAS** 95-63-6
$C_6H_3(CH_3)_3$	**RTECS** DC3325000
Synonyms & Trade Names Assymetrical trimethylbenzene, psi-Cumene, Pseudocumene [Note: Hemimellite is a mixture of the 1,2,3-isomer with up to 10% of related aromatics such as the 1,2,4-isomer.]	**DOT ID & Guide**

Exposure Limits	NIOSH REL: TWA 25 ppm (125 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 4.92 mg/m^3

Physical Description
Clear, colorless liquid with a distinctive, aromatic odor.

MW: 120.2	BP: 337°F	FRZ: -77°F	Sol: 0.006%
VP(56°F): 1 mmHg	IP: 8.27 eV		Sp.Gr: 0.88
Fl.P: 112°F	UEL: 6.4%	LEL: 0.9%	

Class II Flammable Liquid

Incompatibilities & Reactivities
Oxidizers, nitric acid

Measurement Methods
OSHA PV2091
See: NMAM or OSHA Methods

Personal Protection & Sanitation Skin: Prevent skin contact Eyes: Prevent eye contact Wash skin: When contaminated Remove: When wet or contaminated Change: No recommendation	**First Aid** (See procedures) Eye: Irrigate immediately Skin: Soap wash Breathing: Respiratory support Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations To be added later

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, fatigue, dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)

Target Organs Eyes, skin, respiratory system, central nervous system, blood

See also: INTRODUCTION See ICSC CARD: 1433

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NIOSH Pocket Guide to Chemical Hazards

1,3,5-Trimethylbenzene	**CAS** 108-67-8
$C_6H_3(CH_3)_3$	**RTECS** OX6825000
Synonyms & Trade Names Mesitylene, Symmetrical trimethylbenzene, sym-Trimethylbenzene	**DOT ID & Guide** 2325 129

Exposure Limits	NIOSH REL: TWA 25 ppm (125 mg/m^3)
	OSHA PEL†: none
IDLH N.D. See: IDLH INDEX	**Conversion** 1 ppm = 4.92 mg/m^3

Physical Description
Clear, colorless liquid with a distinctive, aromatic odor.

MW: 120.2	BP: 329°F	FRZ: -49°F	Sol: 0.002%
VP: 2 mmHg	IP: 8.39 eV		Sp.Gr: 0.86
Fl.P: 122°F	UEL: ?	LEL: ?	

Class II Flammable Liquid

Incompatibilities & Reactivities
Oxidizers, nitric acid

Measurement Methods
OSHA PV2091
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet or contaminated
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash
Breathing: Respiratory support
Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations To be added later

Exposure Routes inhalation, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat, respiratory system; bronchitis; hypochromic anemia; headache, drowsiness, lassitude (weakness, exhaustion), dizziness, nausea, incoordination; vomiting, confusion; chemical pneumonitis (aspiration liquid)

Target Organs Eyes, skin, respiratory system, central nervous system, blood

See also: INTRODUCTION See ICSC CARD: 1155

NIOSH Pocket Guide to Chemical Hazards

Toluene	**CAS** 108-88-3
$C_6H_5CH_3$	**RTECS** XS5250000
Synonyms & Trade Names Methyl benzene, Methyl benzol, Phenyl methane, Toluol	**DOT ID & Guide** 1294 130

Exposure Limits	NIOSH REL: TWA 100 ppm (375 mg/m^3) ST 150 ppm (560 mg/m^3)
	OSHA PEL†: TWA 200 ppm C 300 ppm 500 ppm (10-minute maximum peak)
IDLH 500 ppm See: 108883	**Conversion** 1 ppm = 3.77 mg/m^3

Physical Description
Colorless liquid with a sweet, pungent, benzene-like odor.

MW: 92.1	BP: 232°F	FRZ: -139°F	Sol(74°F): 0.07%
VP: 21 mmHg	IP: 8.82 eV		Sp.Gr: 0.87
Fl.P: 40°F	UEL: 7.1%	LEL: 1.1%	

Class IB Flammable Liquid: Fl.P. below 73°F and BP at or above 100°F.

Incompatibilities & Reactivities
Strong oxidizers

Measurement Methods
NIOSH 1500, 1501, 3800, 4000; OSHA 111
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH
Up to 500 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, nose; lassitude (weakness, exhaustion), confusion, euphoria, dizziness, headache; dilated pupils, lacrimation (discharge of tears); anxiety, muscle fatigue, insomnia; paresthesia; dermatitis; liver, kidney damage

Target Organs Eyes, skin, respiratory system, central nervous system, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0078 See MEDICAL TESTS: 0232

NIOSH Pocket Guide to Chemical Hazards

o-Xylene	**CAS** 95-47-6
$C_6H_4(CH_3)_2$	**RTECS** ZE2450000
Synonyms & Trade Names 1,2-Dimethylbenzene; ortho-Xylene; o-Xylol	**DOT ID & Guide** 1307 130

Exposure Limits	NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 150 ppm (655 mg/m^3)
	OSHA PEL†: TWA 100 ppm (435 mg/m^3)
IDLH 900 ppm See: 95476	**Conversion** 1 ppm = 4.34 mg/m^3

Physical Description
Colorless liquid with an aromatic odor.

MW: 106.2	BP: 292°F	FRZ: -13°F	Sol: 0.02%
VP: 7 mmHg	IP: 8.56 eV		Sp.Gr: 0.88
Fl.P: 90°F	UEL: 6.7%	LEL: 0.9%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids

Measurement Methods
NIOSH 1501, 3800; OSHA 1002
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH/OSHA
Up to 900 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0084 See MEDICAL TESTS: 0243

NIOSH Pocket Guide to Chemical Hazards

m-Xylene	**CAS** 108-38-3
$C_6H_4(CH_3)_2$	**RTECS** ZE2275000
Synonyms & Trade Names 1,3-Dimethylbenzene; meta-Xylene; m-Xylol	**DOT ID & Guide** 1307 130

Exposure Limits	NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 150 ppm (655 mg/m^3)
	OSHA PEL†: TWA 100 ppm (435 mg/m^3)
IDLH 900 ppm See: 95476	**Conversion** 1 ppm = 4.34 mg/m^3

Physical Description
Colorless liquid with an aromatic odor.

MW: 106.2	BP: 282°F	FRZ: -54°F	Sol: Slight
VP: 9 mmHg	IP: 8.56 eV		Sp.Gr: 0.86
Fl.P: 82°F	UEL: 7.0%	LEL: 1.1%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids

Measurement Methods
NIOSH 1501, 3800; OSHA 1002
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH/OSHA
Up to 900 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0085 See MEDICAL TESTS: 0243

NIOSH Pocket Guide to Chemical Hazards

p-Xylene	**CAS** 106-42-3
$C_6H_4(CH_3)_2$	**RTECS** ZE2625000
Synonyms & Trade Names 1,4-Dimethylbenzene; para-Xylene; p-Xylol	**DOT ID & Guide** 1307 130

Exposure Limits	NIOSH REL: TWA 100 ppm (435 mg/m^3) ST 150 ppm (655 mg/m^3)
	OSHA PEL†: TWA 100 ppm (435 mg/m^3)
IDLH 900 ppm See: 95476	**Conversion** 1 ppm = 4.41 mg/m^3

Physical Description
Colorless liquid with an aromatic odor. [Note: A solid below 56°F.]

MW: 106.2	BP: 281°F	FRZ: 56°F	Sol: 0.02%
VP: 9 mmHg	IP: 8.44 eV		Sp.Gr: 0.86
Fl.P: 81°F	UEL: 7.0%	LEL: 1.1%	

Class IC Flammable Liquid: Fl.P. at or above 73°F and below 100°F.

Incompatibilities & Reactivities
Strong oxidizers, strong acids

Measurement Methods
NIOSH 1501, 3800; OSHA 1002
See: NMAM or OSHA Methods

Personal Protection & Sanitation
Skin: Prevent skin contact
Eyes: Prevent eye contact
Wash skin: When contaminated
Remove: When wet (flammable)
Change: No recommendation

First Aid (See procedures)
Eye: Irrigate immediately
Skin: Soap wash promptly
Breathing: Respiratory support
Swallow: Medical attention immediately

Important additional information about respirator selection
Respirator Recommendations NIOSH/OSHA
Up to 900 ppm: (APF = 10) Any chemical cartridge respirator with organic vapor cartridge(s)*/(APF = 25) Any powered, air-purifying respirator with organic vapor cartridge(s)*/(APF = 10) Any supplied-air respirator*/(APF = 50) Any self-contained breathing apparatus with a full facepiece
Emergency or planned entry into unknown concentrations or IDLH conditions: (APF = 10,000) Any self-contained breathing apparatus that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode/(APF = 10,000) Any supplied-air respirator that has a full facepiece and is operated in a pressure-demand or other positive-pressure mode in combination with an auxiliary self-contained positive-pressure breathing apparatus
Escape: (APF = 50) Any air-purifying, full-facepiece respirator (gas mask) with a chin-style, front- or back-mounted organic vapor canister/Any appropriate escape-type, self-contained breathing apparatus

Exposure Routes inhalation, skin absorption, ingestion, skin and/or eye contact

Symptoms Irritation eyes, skin, nose, throat; dizziness, excitement, drowsiness, incoordination, staggering gait; corneal vacuolization; anorexia, nausea, vomiting, abdominal pain; dermatitis

Target Organs Eyes, skin, respiratory system, central nervous system, gastrointestinal tract, blood, liver, kidneys

See also: INTRODUCTION See ICSC CARD: 0086 See MEDICAL TESTS: 0243

National Institute for Occupational Safety and Health NIOSH

RTECS

The Registry of Toxic Effects of Chemical Substances

Potassium bromide

RTECS #: TS7650000

CAS #: 7758-02-3

UPDATE: October 1997	MW: 119.01	MF: BrK

NOTE:

- **TOXICITY DATA HAVE NOT BEEN EVALUATED. OMISSION OF A SUBSTANCE OR NOTATION DOES NOT IMPLY ANY RELIEF FROM REGULATORY RESPONSIBILITY.**

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SYNONYMS:	
1. Tripotassium tribromide	2. Bromide salt of potassium

SKIN AND EYE IRRITATION DATA AND REFERENCES:			
ROUTE/ ORGANISM	DOSE	EFFECT	REFERENCE

N/R	N/R	N/R	N/R

MUTATION DATA AND REFERENCES:

SYSTEM TEST	ROUTE/ ORGANISM/ TISSUE	DOSE	REFERENCE
cytogenetic analysis	rat Ascites tumor	200 mg/kg	GANNA2 54,155,1963

REPRODUCTIVE EFFECTS DATA AND REFERENCES:

ROUTE/ ORGANISM	DOSE	EFFECT	REFERENCE
N/R	N/R	N/R	N/R

TUMORIGENIC DATA AND REFERENCES:

ROUTE/ ORGANISM	DOSE	EFFECT	REFERENCE
N/R	N/R	N/R	N/R

ACUTE TOXICITY DATA AND REFERENCES:

ROUTE/ ORGANISM	DOSE	EFFECT	REFERENCE
intraperitoneal guinea pig	lethal dose (50 percent kill): 980 mg/kg	Olfaction: Other olfaction effects Behavioral: Somnolence (general depressed activity) Behavioral: Ataxia	GTPZAB 33 (10),57,1989
intraperitoneal	lethal dose (50 percent	Olfaction: Other olfaction effects Behavioral: Somnolence (general	GTPZAB 33

mouse	kill): 1,030 mg/kg	depressed activity) Behavioral: Ataxia	(10),57,1989
oral mouse	lethal dose (50 percent kill): 3,120 mg/kg	Olfaction: Other olfaction effects Behavioral: Somnolence (general depressed activity) Behavioral: Ataxia	GTPZAB 33 (10),57,1989
oral rat	lethal dose (50 percent kill): 3,070 mg/kg	Olfaction: Other olfaction effects Behavioral: Somnolence (general depressed activity) Behavioral: Ataxia	GTPZAB 33 (10),57,1989

OTHER MULTIPLE DOSE DATA AND REFERENCES:

ROUTE/ ORGANISM	DOSE	EFFECT	REFERENCE
N/R	N/R	N/R	N/R

REVIEWS:

ORGANIZATION	STANDARD	REFERENCE
N/R	N/R	N/R

STANDARDS AND REGULATIONS:

ORGANIZATION	STANDARD	REFERENCE
Environmental Protection Agency (EPA) Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA) 1988	PESTICIDE SUBJECT TO REGISTRATION OR RE-REGISTRATION	FEREAC 54,7740,1989

NIOSH DOCUMENTATION AND SURVEILLANCE:

ORGANIZATION	STANDARD or SURVEY	REFERENCE
National Occupational Hazard Survey 1974	National Occupational Hazard Survey 1974: Hazard Code: 80197; Number of Industries 92; Total Number of Facilities 12,918; Number of Occupations 46; Total Number of Employees Exposed 50,375	
National Occupational Exposure Survey 1983	National Occupational Exposure Survey 1983: Hazard Code: 80197; Number of Industries 66; Total Number of Facilities 10,535; Number of Occupations 55; Total Number of Employees Exposed 115,875; Total Number of Female Employees Exposed 26,600	

STATUS IN FEDERAL AGENCIES:

ORGANIZATION	REFERENCE
EPA TSCA Section 8(b) CHEMICAL INVENTORY	
Used in the photographic industry	
EPA TSCA TEST SUBMISSION (TSCATS) DATA BASE, JANUARY 2001	

REFERENCES:

CODEN	REFERENCE
FEREAC	Federal Register. (U.S. Government Printing Office, Supt. of Documents, Washington, DC 20402) V.1- 1936-
GANNA2	Gann. Japanese Journal of Cancer Research. (Tokyo, Japan) V.1-75, 1907-84. For publisher information, see JJCREP.
GTPZAB	Gigiena Truda i Professional'nye Zabolevaniya. Labor Hygiene and Occupational Diseases. (V/O Mezhdunarodnaya Kniga, 113095 Moscow, USSR) V.1-36, 1957-1992. For publisher information, see MTPEEI

Used in the photographic industry

RTECS Compound Description:
Mutagen