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WASTE CHARACTERIZATION STUDY FINAL HEALTH AND SAFETY PLAN MILLINGTON
SUPPACT TN
8/18/1995
ENSAFE ALLEN AND HOSHALL

**COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY
NAVAL AIR STATION
MEMPHIS, TENNESSEE**

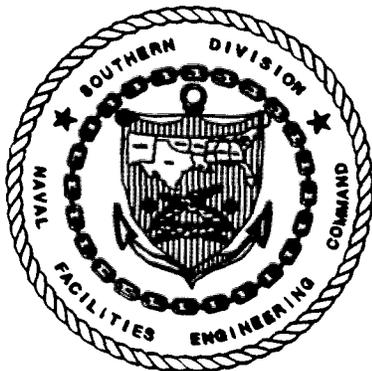


**WASTE CHARACTERIZATION STUDY
FINAL HEALTH AND SAFETY PLAN**

**CTO-092
Contract Number: N62467-89-D-0318**

Prepared for:

**Department of the Navy
Southern Division
Naval Facilities Engineering Command
North Charleston, South Carolina**



Prepared by:

**EnSafe/Allen & Hoshall
5720 Summer Trees Drive, Suite 8
Memphis, Tennessee 38134
(901) 383-9115**

August 18, 1995

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ENVIRONMENTAL ACTION NAVY
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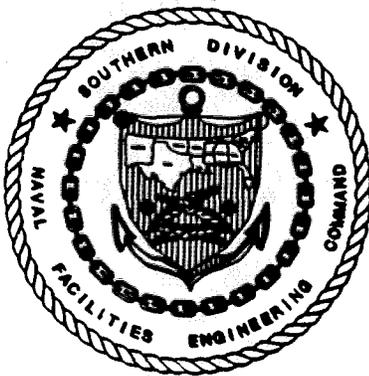
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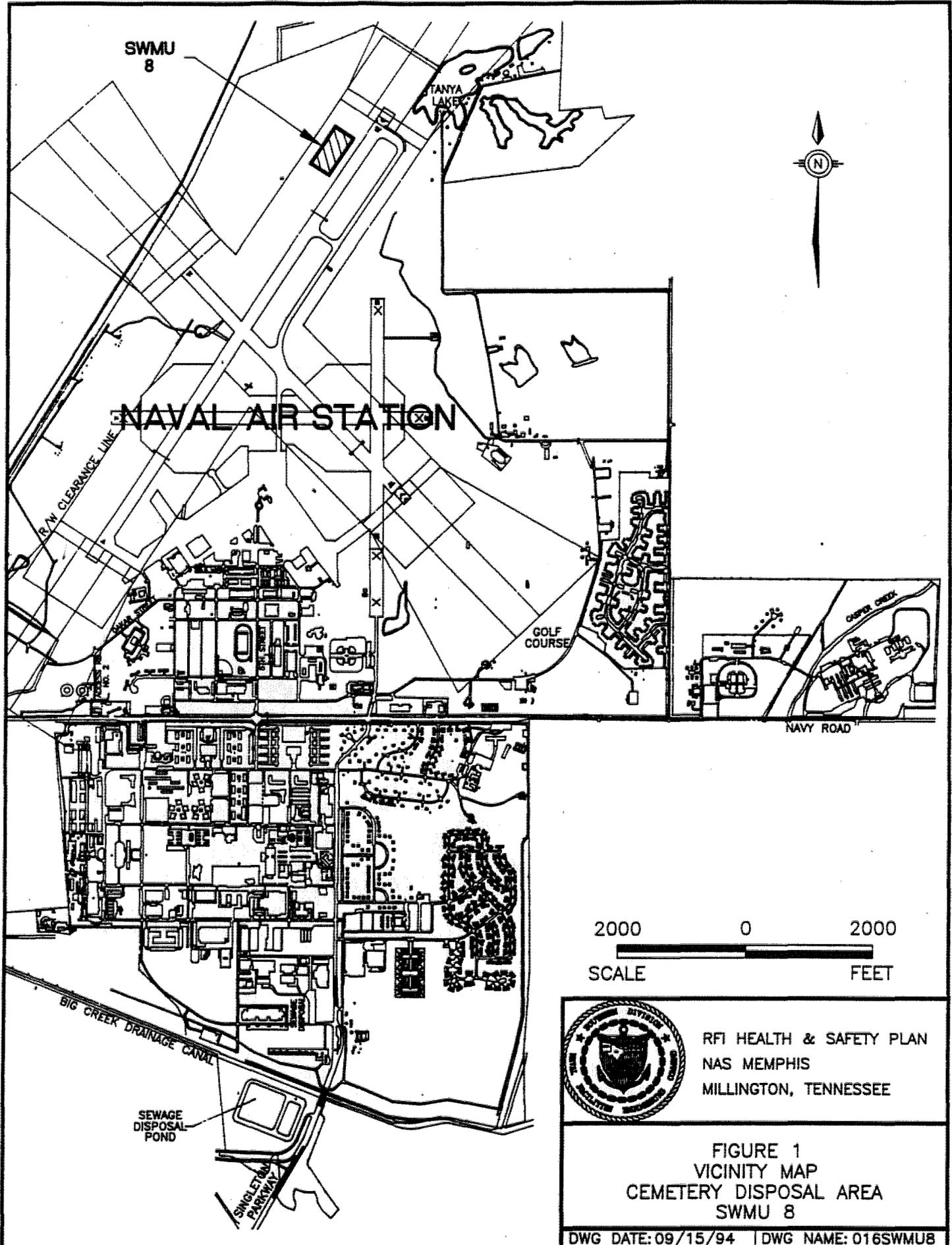
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1.0 INTRODUCTION

The following is the EnSafe/Allen & Hoshall (E/A&H) Health and Safety Plan (HASP) for the waste characterization activities to be performed at the Naval Air Station (NAS) Memphis in Millington, Tennessee (see Figure 1-1 Site Location Map). This plan specifies the procedures and protective measures that will be used to ensure the health and safety of those working in and around the proposed sampling sites, as well as those who reside and work near the sites.

This study is being to determine the nature and extent of specific wastestreams at NAS Memphis.



SWMU
8

TANYA LAKE

NAVAL AIR STATION

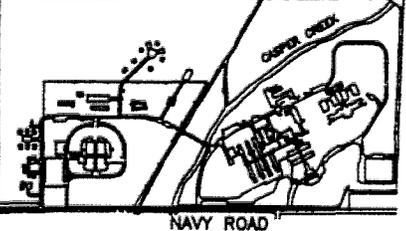
R/W CLEARANCE LINE

GOLF COURSE

BIG CREEK DRAINAGE CANAL

SEWAGE DISPOSAL POND

SINGLETON PARKWAY



NAVY ROAD

2000 0 2000
SCALE FEET



RFI HEALTH & SAFETY PLAN
NAS MEMPHIS
MILLINGTON, TENNESSEE

FIGURE 1
VICINITY MAP
CEMETERY DISPOSAL AREA
SWMU 8

DWG DATE: 09/15/94 | DWG NAME: 016SWMU8

2.0 APPLICABILITY

The provisions of this HASP are mandatory for E/A&H personnel, who must read this plan and sign the acceptance form (see Appendix A) before starting site activities. In addition, personnel will adhere to the most current requirements of Title 29 Code of Federal Regulations (CFR) 1910.120, Standards for Hazardous Waste Operations and Emergency Response, as specified for workers involved with corrective actions under the Resource Conservation and Recovery Act (RCRA).

All non-E/A&H personnel present in E/A&H work areas shall present their own safety plans which, at a minimum, meets the requirements of E/A&H's plan. Subcontractors will be wholly responsible for enforcing the requirements of their plans with their employees and shall provide each employee with the appropriate personal protective equipment (PPE).

This HASP applies to sampling and analysis of solid wastestreams at NAS Memphis. It is unlikely that nonroutine procedures, such as confined space entry, trenching, and sampling, handling, or removing unidentified drums or compressed gas cylinders, will be encountered; therefore, they will not be covered in this plan.

Should it be necessary to conduct these or other high-risk tasks, specific health and safety procedures must be developed, approved, and implemented before proceeding.

3.0 SITE ACTIVITIES

The activities scheduled for the waste characterization study include inventorying of hazardous materials and collecting samples from various wastestreams. The provisions of this HASP do not address sampling drums of unknown contents. **Under no circumstances will samples be collected from drums containing unknown contents without first consulting the project health and safety officer and amending the provisions of this HASP.**

4.0 HAZARD EVALUATION

4.1 Chemical Hazards

Previous site surveys at NAS Memphis have identified numerous activities that use hazardous materials. Table 4-1 lists the generator's name and the building number, and describes the waste which may be present in the facility. To measure, evaluate, and prevent worker exposures, the procedures outlined in this document will account for all available information and will base control procedures and PPE on worst-case scenario assumptions. If only a chemical class is known, exposure monitoring, control procedures, and PPE will be designed to accommodate a wide range of chemicals within that class.

Chemical hazards are selected to represent the range of acute and chronic health (toxicological) hazards that are, or may be, present onsite. Not every chemical known or suspected of being present is listed as a chemical hazard. One or two of the most toxic or most prevalent contaminants within a class of chemicals are listed. Listed below are chemical classes or categories with examples of chemical hazards

Class of Chemical/Product	Chemical Hazard
• Chlorinated solvents	Perchloroethylene, chloroform, and trichloroethylene
• Degreasers	Methylene chloride and 1,1,1-trichloroethane
• Nonchlorinated solvents	Benzene, toluene, xylene, ethylbenzene, 2-butanone, and hexane
• Metals/heavy metals	Lead, cadmium, chromium (especially hexavalent chrome), mercury, silver, and copper
• Fuels — gasoline, fuel oil,	Benzene, toluene, tetraethyl lead, kerosene, xylene
• Paints	See Solvents and Metals above, plus tributyl tin
• Pesticides, chlorinated	DDT, DDE, Chlordane, dieldrin, and endrin

Table 4-1 Wastestream Analysis Recommendations		
Generator Name	Building Number	Waste Description
AIROPS:		
Avionics (600)	N-126	Rags w/Flux Lubricants Grease Alcohol
T-Line	N-4	Fuel (JP-5) Transmission Fluid Waste Engine Oil Waste PD-680 Solvent Rags w/Oil Solvent Grease
DENTAL:		
Dental	S-771	Fixer and Developer Amalgam
FEDERAL PRISON:		
Equipment Maintenance	1410	Used Mineral Spirits Rags w/Thinner Used Oil Used Antifreeze
MWR:		
Graphics	S-797	Cotton Pads w/Ink and Solvent
Auto Hobby Shop	N-397	Spray Booth Filters Used Antifreeze Car Wash Sludge Soda/Lye Water Mixture Used Hydraulic Fluid Used Oil Filters Used Oil Waste Rags Waste Paint/Thinner Sludge Waste Speedy Dry Waste Safety-Kleen Solvent
Golf Course	N-26A	Waste Oil

Table 4-1 Wastestream Analysis Recommendations		
Generator Name	Building Number	Waste Description
Support Group	N-26	Rags w/Oil and Leak Check Rags w/Cleaner and Thinner Waste Paint Waste Oil
Vehicle Maintenance	1211	Used Oil Used Antifreeze Waste Safety-Kleen Solvent Used Hydraulic Fluid Rags w/Grease and/or Oil Spent Absorbent Used Oil Filters Wastewater/Sludge
DYNCORP:		
Boiler Shop	H-100	Used Oil Rags w/Oil and Grease Used Air Filters
Electric and Carpentry	S-77	Oil w/Freon
Transportation	S-9	Rags w/Paint, Oil and Grease Used Oil Used Antifreeze Used Oil Filters Waste Absorbent
Water Treatment	S-772	Waste Rinsate w/Various Chemicals
Steam	Near S-75	Ashes Waste Absorbent
Locksmith/Air Filter Shop	S-235	Asbestos Roofing Materials
OWS Drum Storage	Near S-75	Oil/Water
NATTC: MECHANICAL TRAINING DEPARTMENT:		
AMH-A1	S-785	Waste PD-680 Type II w/Hydraulic Fluid

Table 4-1 Wastestream Analysis Recommendations		
Generator Name	Building Number	Waste Description
AS-A1	S-787	Rags w/Gasoline (soaked) Rags w/Engine Oil, Grease and Hydraulic Fluid
Equipment Maintenance	S-394	Hydraulic Fluid Used Oil Waste Absorbent Waste Safety-Kleen Solvent Rags w/Oil, Hydraulic Fluid, Lubricant, Grease, Sealants, Corrosion Preventative Compound, and PD-680 Used Oil Filters
EAF	N-1734	Waste Oil Dry Sweep Rags w/Oil and Grease
JOAP	S-241	Methanol Rags w/Oil Waste Toluene, Isopropyl Alcohol, and Hydraulic Fluid
AMS	S-784	Water w/Alodine Waste Paint and Solvent
FSB	S-54	Rags w/Electrostatic Solution and Deglazing Solvent
BEECH AIRCRAFT:	B-798	Waste Fuel (JP-5) Paint-Related Waste Waste Turbo Oil Waste Absorbent
BRIG:	N-796	Used Oil
NEX:		
Service Station	S-341	Used Oil Waste Antifreeze Rags w/Oil, Grease, and Safety-Kleen Solvent Waste Absorbent Used Oil Filters

Table 4-1 Wastestream Analysis Recommendations		
Generator Name	Building Number	Waste Description
NAVAL HOSPITAL: Dental	H-100	Silvery/Mercury Mixture

Table 4-2 lists the specific chemical hazards as identified in Table 4-1.

Physical and toxicological properties of substances listed by National Institute for Occupational Safety and Health (NIOSH), the Occupational Safety and Health Administration (OSHA), and/or the American Conference of Governmental Industrial Hygienists for the site are presented in Material Safety Data Sheets (MSDS) in Appendix B. These documents will be reviewed at the start-up meeting before work begins.

Flammable vapors from petroleum products and flammable gases present a hazard of fire or explosion. All lights, test instruments, and other electrical equipment must be explosion-proof or intrinsically safe if operated in areas previously identified as containing flammable gases. Open flames and smoking are not permitted in any work area.

Equipment with internal combustion engines must be equipped with flame and spark arresters. Before descending into a ditch, ravine, or gully that is: (1) more than 5 feet deep and (2) less than half as wide as it is deep, approval must be obtained from the project health and safety officer and the atmosphere must be monitored for the presence of flammable gases. If concentrations of flammable gases exceed 10% of the Lower Explosive Limits (LEL), the area must be investigated carefully. Before resuming onsite activities, project personnel must develop a refined safety plan in consultation with personnel skilled in fire or explosion hazards.

Table 4-2 Workplace Chemical Hazards Exposure Information						
Compound	Ionization Potential (ev)	Odor Threshold (ppm)	OSHA PEL	ACGIH TLV	NIOSH REL	Action Level
Organic Solvents/Degreasers						
Perchloroethylene	9.3	5	25 ppm	25 ppm 100 ppm - STEL	Potential Occupational Carcinogen	12 ppm
Chloroform	11.4	205	2 ppm	10 ppm Suspected Human Carcinogen	2 ppm Potential Occupational Carcinogen	1 ppm
Trichloroethylene	9.5	50	50 ppm 200 ppm - STEL	50 ppm 100 ppm - STEL	25 ppm Potential Occupational Carcinogen	12 ppm
Vinyl Chloride	7.6	260	1 ppm 5 ppm - Ceiling Confirmed Carcinogen	5 ppm Confirmed Human Carcinogen	Potential Occupational Carcinogen	0.5 ppm
Methylene Chloride	11.4	214	500 ppm 1,000 ppm - Ceiling	50 ppm Suspected Human Carcinogen	Potential Occupational Carcinogen	25 ppm
1,1,1-Trichloroethane	Not Listed	100	350 ppm 450 ppm - STEL	350 ppm 450 ppm - STEL	350 ppm - Ceiling	175 ppm

Table 4-2 Workplace Chemical Hazards Exposure Information						
Compound	Ionization Potential (ev)	Odor Threshold (ppm)	OSHA PEL	ACGIH TLV	NIOSH REL	Action Level
Benzene	9.25	4.7	1 ppm 5 ppm - STEL	10 ppm Suspected Human Carcinogen	0.1 ppm 1 ppm Ceiling Potential Occupation Carcinogen	0.5 ppm
Toluene	8.8	40	100 ppm 150 ppm	50 ppm Skin	100 ppm 200 ppm - Ceiling	25 ppm
Ethylbenzene	8.8	140	100 ppm 125 ppm - STEL	100 ppm 125 ppm - STEI	Not Listed	50 ppm
Xylene	8.6	0.05	100 ppm 150 ppm - STEL	100 ppm 150 ppm - STEL	100 ppm 200 ppm - Ceiling	50 ppm
Formaldehyde	10.9	0.05 ppm	0.75 ppm 2 ppm - Ceiling	0.3 ppm - Ceiling	0.016 ppm 0.1 - Ceiling	0.008 ppm
Isopropyl Alcohol	10.1	N/A	400 ppm 500 ppm - STEL	400 ppm 500 ppm - STEL	400 ppm 800 ppm - STEL	200 ppm
2-Butanone (MEK)	6.7	10	200 ppm 300 ppm - STEL	200 ppm 300 ppm - STEL	200 ppm	100 ppm
Hexane	10.2	130 ppm	500 ppm 1000 ppm - STEL	50 ppm	100 ppm	25 ppm
Polychlorinated Biphenyls (PCBs)	Not Listed	Not Listed	0.5 mg/m ³ Skin	0.5 mg/m ³ 1 mg/m ³ Skin	Not Listed	0.25 mg/m ³
Ethylene Glycol	9.3	Not Listed	50 ppm - Ceiling	50 ppm - Ceiling	Not Listed	25 ppm

Table 4-2 Workplace Chemical Hazards Exposure Information						
Compound	Ionization Potential (ev)	Odor Threshold (ppm)	OSHA PEL	ACGIH TLV	NIOSH REL	Action Level
Metals						
Lead	N/A	N/A	0.05 mg/m ³	0.15 mg/m ³	<0.1 mg/m ³	0.025 mg/m ³
Cadmium	N/A	N/A	0.05 mg/m ³	0.002 mg/m ³ - Respirable Fraction 0.01 mg/m ³ - Total Dust	Lowest Feasible Concentration	0.01 mg/m ³
Chromium	N/A	N/A	1 mg/m ³	1 mg/m ³	0.5 mg/m ³	0.25 mg/m ³
Mercury	N/A	N/A	0.05 mg/m ³ - Skin	0.025 mg/m ³ - Skin	0.05 mg/m ³	0.012 mg/m ³
Silver	N/A	N/A	0.01 mg/m ³	0.1 mg/m ³	Not Listed	0.005 mg/m ³
Copper	N/A	N/A	0.1 mg/m ³ - Fume 1 mg/m ³ - Dust	0.2 mg/m ³ - Fume 1 mg/m ³ - Dust	Not Listed	0.05 mg/m ³ - Fume 0.5 mg/m ³ - Dust
Potassium Cyanide	N/A	N/A	5 mg/m ³	5 mg/m ³ - Ceiling Skin	5 mg/m ³ - Ceiling	2.5 mg/m ³
Sodium Cyanide	N/A	N/A	5 mg/m ³	5 mg/m ³ - Ceiling Skin	5 mg/m ³ - Ceiling	2.5 mg/m ³

Table 4-2 Workplace Chemical Hazards Exposure Information						
Compound	Ionization Potential (ev)	Odor Threshold (ppm)	OSHA PEL	ACGIH TLV	NIOSH REL	Action Level
Nickel	Not Listed	Not Listed	1 mg/m ³	1 mg/m ³	0.015 mg/m ³ Potential Occupational Carcinogen	0.007 mg/m ³

Table 4-2 Workplace Chemical Hazards Exposure Information						
Compound	Ionization Potential (ev)	Odor Threshold (ppm)	OSHA PEL	ACGIH TLV	NIOSH REL	Action Level
Fuels						
Benzene	9.25	4.7	1 ppm 5 pp, - STEL	10 ppm Suspected Human Carcinogen	0.1 ppm 1 ppm - Ceiling Potential Occupational Carcinogen	0.5 ppm
Toluene	8.8	40	100 ppm 150 STEL	500 ppm - Skin	100 ppm 200 ppm - Ceiling	225 ppm
Ethyl benzene	8.8	140	100 ppm 125 ppm - STEL	100 ppm 125 ppm - STEL	Not Listed	50 ppm
Xylene	8.6	0.05	100 ppm 150 ppm - STEL	100 ppm 150 - STEL	100 ppm 200 ppm - Ceiling	50 ppm
Tetraethyl Lead	11.1	Not Listed	0.075 mg/m ³ - Skin	0.1 mg/m ³ - Skin	<0.1 mg/m ³	0.037 mg/m ³
Kerosene	6.8	1	Not Listed	Not Listed	100 mg/m ³	50 mg/m ³

Table 4-2 Workplace Chemical Hazards Exposure Information						
Compound	Ionization Potential (ev)	Odor Threshold (ppm)	OSHA PEL	ACGIH TLV	NIOSH REL	Action Level
Acids						
Nitric Acid	N/A	N/A	2 ppm 4 ppm - STEL	2 ppm 4 ppm - STEL	2 ppm	1 ppm
Sulfuric Acid	N/A	N/A	1 mg/m ³	1 mg/m ³ 3 mg/m ³ - STEL	1 mg/m ³	0.5 mg/m ³
Hydrochloric Acid	N/A	N/A	7 mg/m ³ - Ceiling	7 mg/m ³ - Ceiling	N/A	3.5 mg/m ³
Phosphoric Acid	14.9	N/A	1 mg/m ³ 3 mg/m ³ - STEL	1 mg/m ³ 3 mg/m ³ - STEL	N/A	0.5 mg/m ³
Chromic Acid	N/A	N/A	0.1 mg/m ³ - Ceiling	0.05 mg/m ³ - Confirmed Human Carcinogen	0.001 mg/m ³	0.0005 mg/m ³
Pesticides						
DDT	Not Listed	Not Listed	1 mg/m ³ - Skin	1 mg/m ³	0.5 mg/m ³	0.25 mg/m ³
DDE	Not Listed	Not Listed	Not Listed	Not Listed	Not Listed	—
Chlordane	13.4	Not Listed	0.5 mg/m ³ - Skin	0.5 mg/m ³ - Skin	Potential Occupational Carcinogen	0.25 mg/m ³
Dieldrin	Not Listed	0.041	0.25 mg/m ³ - Skin	0.25 mg/m ³ - Skin	Potential Occupational Carcinogen	0.12 mg/m ³

Table 4-2 Workplace Chemical Hazards Exposure Information						
Compound	Ionization Potential (eV)	Odor Threshold (ppm)	OSHA PEL	ACGIH TLV	NIOSH REL	Action Level
Endrin	Not Listed	Not Listed	0.1 mg/m ³ - Skin	0.1 mg/m ³ - Skin	Not Listed	0.05 mg/m ³
Malathion	Not Listed	Not Listed	10 mg/m ³	10 mg/m ³ - Skin	15 mg/m ³	5 mg/m ³
Parathion	Not Listed	Not Listed	0.1 mg/m ³ - Skin	0.1 mg/m ³ - Skin	0.05 mg/m ³	0.025 mg/m ³
Additional Site Contaminants						
Freon (Chlorodifluoro- Methane)	Not Listed	Not Listed	1,000 ppm	1,000 ppm	Not Listed	500 ppm
Sodium Hypochlorite	N/A	N/A	N/A	N/A	N/A	N/A
Benzo(a)pyrene	N/A	N/A	N/A	N/A	N/A	N/A
Benzo(b)fluoranthene	N/A	N/A	N/A	N/A	N/A	N/A

Notes:

- ppm = parts per million
- OSHA PEL = Occupational Safety and Health Administration Permissible Exposure Limit
- mg/m³ = milligrams per cubic meter
- ACGIH TVL = American Conference of Governmental Industrial Hygienists Threshold Limit Value
- NIOSH REL = National Institute for Occupational Safety and Health recommended Exposure Limit
- STEL = Short-Term Exposure Limit

If the concentration of flammable gases exceeds 20% of the LEL, all operations must be terminated immediately and the area evacuated. Operations may not be restarted until the atmosphere in the area contains less than 20% LEL of flammable gas.

Physical effects from the inhalation or ingestion of dust may result in many combinations. No respiratory protection is required where techniques limit dust in inspirable levels or where adequate ventilation exists. If airborne concentration is high, the Threshold Limit Value-Time Weighted Average [TLV-TWA] of 10 milligrams per cubic meter [10 mg/m³], a dust and mist air-purifying respirator is recommended. If the concentration exceeds the respirator's capacity, higher levels of protection are recommended.

4.2 Eye Hazards

This program applies to all employees, subcontractors, and visitors to NAS Memphis. It provides for compliance with federal and E/A&H eye protection standards. Suitable eye protection equipment will be required in areas where machines or operations present the hazard of chips, other flying objects, glare, compressed gases, liquids, injurious radiation, or a combination of these hazards to the eye.

These areas include, but are not limited to:

- All manufacturing, assembly, warehouse, and development areas (welding and machine shops, processing and sheet metal shops, electrical and tubing production areas, explosive and functional test areas, and airport operations areas);
- Tool fabrication shops;
- Electrical and electronic test laboratories;

- Maintenance and salvage operations;
- Experimental shops;
- Chemical, fluid, and mechanical testing laboratories;
- Shipping and receiving areas and other warehouse operations; and
- Operation of in-plant transportation equipment (e.g., lift trucks, flat-bed trucks, motor scooters, and bicycles).

Workers and observers will wear safety glasses (with side shields) or goggles in those areas outlined above. Personnel will wear sealed chemical-protective goggles when exposed to chemical reaction and spills, or fluids under pressures.

Obtaining Eye Protection Equipment

E/A&H employees who do not require corrective lenses are furnished standard, nonprescription safety glasses with side shields at no cost. The E/A&H site supervisor will ensure that safety glasses are available. Safety glasses for visitors can also be obtained from the site manager. All subcontractor personnel are required to supply their employees' safety glasses with side shields at all times for work in areas listed above.

E/A&H employees who wear corrective lenses may purchase prescription safety glasses with side shields with the approval of the E/A&H health and safety manager. Employees with monocular vision (vision in one eye) are required to wear approved eye protection at all times in areas listed above.

If these employees require additional eye protection, they will wear goggles or spectacles of the following types:

- Spectacles that meet or exceed the American National Standards Institute (ANSI) Z87.1-1968 standard.
- Goggles that can be worn over corrective spectacles without disturbing the adjustment of the spectacles.
- Goggles that incorporate corrective lenses mounted behind the protective lenses.

Enforcement

The E/A&H site supervisor, E/A&H site health and safety manager, and subcontractor supervisors are responsible for:

- Determining the potential eye-hazard operations in the area under their control and ensuring that proper eye protection is worn by all persons entering those areas.
- Ensuring compliance with the eye protection standards in this plan.
- Requesting that individuals leave a specified eye protection area if they are not wearing proper eye protection. (They may return as soon as they obtain the proper eye protection.) This responsibility extends to individuals over whom the E/A&H site supervisor and site health and safety manager or subcontractor supervisor might have no immediate control.
- Requesting additional or replacement EYE PROTECTION REQUIRED signs when needed.

- **Setting a good example by following the eye protection requirements without exception.**
- **Reviewing changes in processes, operations, and facilities to determine the need for eye protection requirements.**

5.0 EMPLOYEE PROTECTION

Employee protection for this project includes standard safe work practices, PPE, procedures, and equipment for extreme weather conditions, work limitations, and exposure evaluation.

5.1 Standard Safe Work Practices

Standard safe work and personal hygiene practices that will be followed include those described in this section:

- Eating, drinking, chewing gum or tobacco, smoking, or any activity that increases the probability of hand-to-mouth transfer and ingestion of material is prohibited in any area designated as contaminated, unless authorized by the site health and safety manager.
- Hands and face must be thoroughly washed upon leaving the work area.
- Whenever decontamination procedures for outer garments are in effect, the entire body should be thoroughly washed as soon as possible after the protective garment is removed.
- Contact with surfaces suspected of being contaminated should be avoided. Whenever possible, employees should not walk through puddles, leachate, or discolored surfaces, or lean, sit, or place equipment on drums, containers, or soil suspected of being contaminated.
- Medicine and alcohol can exacerbate the effects from exposure to toxic chemicals. Prescribed drugs should not be taken by personnel on cleanup or response operations where the potential for absorption, inhalation, or ingestion of toxic substances exists unless specifically approved by a qualified physician. Consumption of alcoholic beverages or use of illegal drugs is prohibited before or during operations.
- Undergarments should be made from natural fibers (i.e., cotton or wool).

5.2 NAS Memphis General Rules of Conduct

- Liquor, firearms, cameras, narcotics, tape recorders, and other contraband items are not permitted on the premises.
- Any violation of local, state, or federal laws, or conduct which is outside the generally accepted moral standards of the community is prohibited.
- Violation of the Espionage Act, willfully hindering or limiting production, or sabotage is prohibited.
- Willfully damaging or destroying property, or removing NAS Memphis or government records is forbidden.
- Misappropriation or unauthorized alteration of any NAS Memphis or government records is forbidden.
- Securing NAS Memphis tools in a personal or contractors' tool box is forbidden.
- Gambling in any form, selling tickets, articles, taking orders, soliciting subscriptions, taking up collections, etc., is forbidden.
- Doing personal work in a NAS Memphis shop or office, using NAS Memphis property or material for unauthorized purposes, or using NAS Memphis or government telephones for unnecessary or unauthorized local or long-distance telephone calls is forbidden.
- Compliance with posted signs and notices is required.
- Adjusting or repairing NAS Memphis machinery without authorization is forbidden.

- Boisterousness and noisy or offensive work habits, abusive language, or any verbal, written, symbolic, or other communicative expression which tends to disrupt production or morale is forbidden.
- Fighting or threatening bodily harm to another is forbidden.
- Defacing any NAS Memphis property is forbidden.
- Wearing shorts of any type and/or offensive logos, pictures, or phrases on clothing is forbidden. Shirts, shoes, and pants, slacks, or coverall-type garments will be worn at all times on NAS Memphis property.

5.3 Personal Protective Equipment

The selection of personal protective equipment (PPE) is based on information collected from:

- RCRA Permit No. TN2 170 022 600 (HSPA-TN 002) (U.S. Environmental Protection Agency [USEPA] Region IV 9/15/86).
- Southern Division, Naval Facilities Engineering Command (SOUTHNAVFACENGCOM) (August 1990) *RCRA Facility Assessment* (August 1990), NAS Memphis, Millington, Tennessee.
- SOUTHNAVFACENGCOM (May 1990), *Draft Final RCRA Facility Investigation Work Plan*. Memphis Naval Air Station, Millington, Tennessee.

All activities at the site will be performed using modified Level D PPE. See Table 5-1 for a description of Level D PPE. Level D protection consists of hard hat (when overhead hazards exist); appropriate chemical-resistant gloves (nitrile or North Silver Shield if contaminants are

unknown); protective inner gloves (latex); eye protection with sideshields; chemical-resistant, steel toed and shank boots; coveralls (optional) with full-length sleeves and pants; and disposable outer boots (optional). Level D protection was selected because concentrations of the substances at the respective area is not expected to reach the action levels prescribed for this site (50% of TLV-TWA per substance). Handling soil samples represents the greatest potential for chemical exposure to individuals working onsite.

Air monitoring for volatile organic compounds (VOCs) will be performed continuously during all sampling operations using a photoionization detector (PID). The instrument will be continuous reading and intrinsically safe. An upgrade to Level C will be initiated if VOC concentrations in the breathing zone exceed the action levels or background levels by 5 parts per million (ppm), whichever is lower.

5.4 General Measures

A primary goal of E/A&H is to prevent all occupationally related injuries and illnesses. The following practices are presented as general precautions for reducing the risks associated with hazardous waste and spill operations. Failure to adhere to the measures will result in disciplinary action.

Table 5-1 Level of Protection and Criteria		
Level of Protection	Criteria for Use	Equipment
Level A	<ul style="list-style-type: none"> • When atmospheres are "immediately dangerous to life and health" (IDLH in the NIOSH/OSHA Pocket Guide to Chemical Hazards or other guides.) • When known atmospheres or potential situations exist that would affect the skin or eyes or be absorbed into the body through these surfaces. Consult standard references to obtain concentrations hazardous to skin, eyes, or mucous membranes. • Potential situations include those where immersion may occur, vapors may be generated, or splashing may occur through site activities. • Where atmospheres are oxygen deficient with the conditions above. • When the type(s) and or potential concentration of toxic substances are not known. 	<ul style="list-style-type: none"> • Positive pressure-demand full facepiece self-contained breathing apparatus (SCBA) or positive pressure-demand supplied-air respirator with escape SCBA • Totally encapsulating chemical-protective suit • Chemical-resistant inner and outer gloves • Steel toe and shank chemical-resistant boots • Hard hat under suit • Two-way radios worn inside suit • Optionally: coveralls, long cotton underwear, disposable protective suit, gloves and boots, worn over fully encapsulating suit
Level B	<ul style="list-style-type: none"> • When work areas contain less than 19.5% oxygen • When concentrations of any contaminant exceed 50% of PEL 	<ul style="list-style-type: none"> • Chemical-resistant clothes, long sleeves, hooded, one or two pieces • Full-faced positive-pressure supplied-air breathing apparatus or airline system with a 30-minute escape bottle • Hard hat • Inner gloves and chemical-resistant gloves • Steel toe and shank boots • Optionally: coveralls and disposable outer boots
Level C	<ul style="list-style-type: none"> • When airborne particulates (dust) warrant respiratory protection • When work areas contain at least 19.5% oxygen 	<ul style="list-style-type: none"> • Chemical-resistant clothes, long sleeves, hood optional, one or two pieces • Full facepiece, air-purifying respirator equipped with cartridges suitable for the hazard • Hard hat • Inner gloves and chemical-resistant gloves • Steel toe and shank boots • Coveralls and disposable outer boots

Table 5-1 Level of Protection and Criteria		
Level of Protection	Criteria for Use	Equipment
Modified Level D	<ul style="list-style-type: none"> • When level B or C is not indicated • When airborne particulates do not warrant respiratory protection • When work areas contain at least 19.5% oxygen 	<ul style="list-style-type: none"> • Inner gloves and chemical-resistant gloves (vinyl or nitrile) needed to handle soil or water samples • Steel toe and shank boots • Hard hat (ANSI Z891-1969 standard) • Eye protection (ANSI Z87.1-1968) standard • Optionally: coveralls and disposable outer boots

Notes:

Level A protection will be selected when the highest available level of respiratory, skin, and eye protection is needed. Level A protection will be required in Area A of the exclusion zone.

Contraindications for Use of Level A:

- Environmental measures contiguous to the site indicate that air contaminants do not represent a serious dermal hazard.
- Reliable, accurate historical data do not indicate the presence of severe dermal hazards.
- Open, unconfined areas.
- Minimal probability of vapors or liquids (splash hazards) present which could affect or be absorbed through the skin.
- Total vapor readings indicate 500 to 1,000 ppm.

Level B protection will be selected when the highest level of respiratory protection is needed, but cutaneous exposure to the small unprotected areas of the body (neck and back of head) is

unlikely, or where concentrations are not known to be within acceptable standards. Additionally, the permissible limit for exposure to mixtures of all site gases will be checked using the requirements of 1910.1000(d)(2)(i) to ensure that PEL is not exceeded. If the value calculated using this method exceeds 1.0, Level B PPE is required.

Level C protection will be selected when the types and concentrations of inseparable material is know, or reasonably assumed to be no greater than the protection factors associated with air-purifying respirators, and exposure to the unprotected areas of the body is unlikely to cause harm.

Dust concentrations require Level C PPE, where the respirable fractions exceed the PEL of 5 mg/m³ or the total concentrations exceed the PEL of 15 mg/m³.

Level D protection will be chosen when measurements of atmospheric concentrations are at background levels and work functions preclude splashes, immersion, or the potential for unexpected inhalation or contact with hazardous concentrations of any chemicals.

5.4.1 Personal Protection

1. Be familiar with and knowledgeable about standard operating safety procedures.
2. Be familiar with, knowledgeable about, and adhere to instructions in site safety plan.
3. Identify and arrange for emergency medical assistance. The location, telephone number, and transportation capabilities of the nearest emergency medical facilities should be known. For particularly hazardous operations, the onsite medical facility should be alerted.

4. Consider fatigue, heat stress, cold exposure, and other environmental factors influencing efficiency of personnel.
5. Wear only NIOSH-approved or designated respiratory protective devices and protective clothing.

5.4.2 Selection of Personal Protective Equipment

It is important that PPE be appropriate to protect against the potential or known hazards at each investigation site. Protective equipment will be selected and based upon the types, concentrations, and routes of personal exposure that may be encountered. In situations where the types of materials and possibilities of contact are unknown or the hazards are not clearly identifiable, a more subjective determination must be made of the PPE required, based on experience and sound safety practices.

The appropriate level of protection will be determined before the initial entry based on the best available information. The level of protection will be included in the site-specific safety plan. Subsequent information (i.e., sampling results and site observations), may necessitate changes in the original level selected, which will be added to specific site safety plans as changes.

The levels of personal protection were determined by the USEPA and are to be used in selecting equipment for onsite activities. The levels are designated as Level A, B, C, and D.

Protective Clothing and Accessories

In this section, personal protective clothing is considered to be any article offering skin and/or body protection.

Personal protective clothing includes:

- Fully encapsulating suits.
- Nonencapsulating suits.
- Aprons, leggings, and sleeve protectors.
- Gloves.
- Firefighters' protective clothing.
- Proximity, or approach, garments.
- Blast and fragmentation suits
- Cooling garments.
- Radiation-protective suits.

Each type of protective clothing has a specific purpose; many, but not all, are designed to protect against chemical exposure.

PPE accessories include:

- Knife
- Flashlight or lantern
- Personal locator beacon
- Personal dosimeters
- Two-way radio
- Safety belts and lines

5.4.3 Selection of Ensembles

The individual components of clothing and equipment must be assembled into a full protective ensemble that both protects the worker from the site-specific hazards and minimizes the hazards and drawbacks of the PPE ensemble itself.

Table 5-1 lists ensemble components based on the widely used USEPA levels of protection: Levels A, B, C, and D. This list can be used as a starting point for ensemble creation; however, each ensemble must be tailored to the specific situation to provide the most appropriate level of protection. For example, if work is being conducted at a highly contaminated site or if the potential for contamination is high, it may be advisable to wear a disposable covering, such as Tyvek coveralls or polyvinyl chloride splash suits over the protective ensemble. It may be necessary to slit the back of these disposable suits to fit around the bulge of an encapsulating suit and self-contained breathing apparatus (SCBA).

The type of equipment used and the overall level of protection should be reevaluated periodically as the amount of information about the site increases, and as workers are required to perform different tasks. Personnel should be able to upgrade or downgrade their level of protection with the concurrence of the site safety officer and approval of the field team leader.

Reasons to upgrade:

- Known or suspected presence of dermal hazards.
- Occurrence or likely occurrence of gas or vapor emission.
- Change in work task increases contact or potential contact with hazardous materials.
- Request of the individual performing the task.

Reason to downgrade:

- New information indicates the situation is less hazardous than was originally thought.
- Change in site conditions decreases the hazard.

- Change in work task reduces contact with hazardous materials.

5.4.4 PPE Use

PPE can offer a high degree of protection only if used properly. Decontamination is covered in Section 5.6. Inadequate attention to any of these areas could compromise the protection provided by the PPE.

Training

Training in PPE use is recommended. For respirators, it is required by federal regulation in the OSHA standards in 29 CFR Part 1910.

The training:

- Allows the user to become familiar with the equipment in a nonhazardous situation.
- Instills confidence of the user in his or her equipment.
- Makes the user aware of the limitations and capabilities of the equipment.
- Increases the efficiency of operations performed by workers wearing PPE.
- Reduces the expense of PPE maintenance.

Training should be completed before actual PPE use in a hazardous environment and should be repeated at least annually. At a minimum, the training portion of the PPE program should delineate the user's responsibilities and explain the following. Both classroom and field training should be used as needed.

Training will cover:

- OSHA requirements as delineated in 29 CFR Part 1910.

- The proper use and maintenance of the selected PPE, including capabilities and limitations.
- The nature of the hazards and the consequences of not using the PPE.
- The human factors influencing PPE performance.
- Instruction in inspecting, donning, checking, fitting, and using PPE.
- Individualized respirator fit testing to ensure proper fit.
- Use of PPE in normal air for a long familiarity period and, finally, wearing PPE in a test atmosphere to evaluate its effectiveness.
- The user's responsibility (if any) for decontamination, cleaning, maintenance, and repair of PPE.
- Emergency procedures and self-rescue in the event of PPE failure.
- The buddy system.
- The site safety plan and the individual's responsibility and duties in an emergency.

The discomfort and inconvenience of wearing PPE can create a resistance to its conscientious use. One essential aspect of training is to make the user aware of the need for PPE and to instill motivation for the proper use and maintenance of PPE.

5.5 Safety Equipment

All site personnel must be adequately protected from potential health and safety hazards. Therefore, a sufficient and diverse inventory of all safety equipment necessary to meet anticipated hazards will be available to all employees. Personnel and site visitors must be instructed in the proper use of this equipment before entry to the work area is permitted. The list will include first-aid, fire fighting, communications, respiratory protection, protective clothing (suits, gloves, boots, hard hats, goggles, etc.), and monitoring equipment.

5.6 Decontamination

As part of the system to prevent or reduce the physical transfer of contaminants by people or equipment from onsite areas, provisions must be made for decontaminating anything exiting the exclusion and contamination reduction zones. The extent of the decontamination procedures for personnel is highly site-specific and depends upon a number of factors: type of contaminants, amounts of contamination, level of protection, work activities, and reason for leaving the site. The USEPA has developed decontamination procedures for various levels of protection which can be consulted when formulating site-specific decontamination protocols. These procedures are found in *Hazardous Waste Site Activities* (EnSafe Reference 0100-072).

All equipment leaving the exclusion zone should be decontaminated to prevent the offsite migration of hazardous contaminants. In addition, all equipment used onsite should be decontaminated upon completion of the project. In limiting the potential environmental exposures, the following procedures should be used. All contaminated surfaces will be rinsed with the proper decontamination solution as selected by the site safety officer, who also will supervise all decontamination activities. All wastewater generated will be collected, tested, and disposed of as hazardous waste, if necessary.

5.7 Procedures and Equipment for Extreme Weather Conditions

Field activities for this site take place at different times of the year. Therefore, both heat and cold stress will be concerns for the health and safety personnel. Adverse weather conditions are important considerations in planning and conducting site operations. Extremes in hot and cold weather can cause physical discomfort, loss of efficiency, and personal injury.

5.8 Work Limitations

All site activities will be conducted during daylight only. All personnel scheduled for these activities will have completed initial health and safety training and actual field training as specified in 29 CFR 1910.120. All supervisors must complete an additional eight hours of training in site management. All personnel must complete an annual eight-hour refresher training course in order to continue working onsite.

5.9 Exposure Evaluation

All personnel scheduled for site activities will have a baseline physical examination including the neurologic, cardiopulmonary, musculoskeletal and dermatological systems, pulmonary function testing, multichemistry panel and urinalysis, and be declared fit for duty. An exposure history form will be completed for each worker participating in site activities. An examination and updated occupational history will be repeated annually and upon termination of employment as required by 29 CFR 1910.120(f). The content of the annual or termination examination will be the same as the baseline physical. A qualified physician will review the results of the annual examination and exposure data and request further tests or issue medical clearances, as appropriate.

After any job-related injury or illness, there will be a medical examination to determine fitness for duty or for the need for any job restrictions. The site health and safety manager will review the results with the examining physician before releasing the employee for work. A similar examination will be performed if an employee has missed at least three days of work due to a

non-job-related injury or illness requiring medical attention. Medical records shall be maintained by the employer or the physician for at least 30 years following the termination of employment.

The symptoms of exposure to site contaminants are presented in Appendix B — MSDS.

6.0 MONITORING REQUIREMENTS

Air will be monitored for VOCs with a PID during all sampling activities. The instrument, a continuous-reading type equipped with alarms, will be calibrated before site activities begin each day and at the end of each day's activities. Before calibration at the end of the day, each instrument will be checked for surface contamination. The instrument will be decontaminated, if needed.

All air monitoring activities will be logged. This log will indicate the date and time of the readings, the location, the activity that is performed in the area where the readings were taken, the concentrations observed on the instruments, the types of instruments used, and the signature of the person taking the readings. Copies of all log sheets will be made available to any site employee upon request. Action levels for the potential site contaminants are listed in Table 4-2.

In addition to calibrating the instruments as outlined above, all real-time, direct-reading survey instruments will be maintained in accordance with the manufacturers' recommendations.

Certain materials in the sampled atmosphere may affect the sensors in the monitoring equipment and cause the indicator to respond incorrectly. Some of these materials are organic lead and silicon compounds that may poison the combustible gas sensor. When the presence of such materials is suspected, the instrument calibration must be checked before and after each series of tests.

Gases onsite may saturate the sensors so that calibrating the unit will not be possible. If sensors become saturated, the instrument will be immediately tagged **OUT OF SERVICE**. Instruments which fail a field calibration check must be sent to the manufacturer for repair as soon as the problem is noticed.

Initial Monitoring of Respiratory Hazard

Recognizing and evaluating the respiratory hazard (oxygen deficiency or contaminants) will be carried out to obtain data needed to determine the proper respiratory protection. The data must include: (1) identification or characterization of the hazard (oxygen deficiency or specific contaminants); (2) nature of contaminants (particulates or vapor gases); and (3) concentration of respiratory hazard.

7.0 DECONTAMINATION

A decontamination area will be established at each sampling site and will include an area for sampling equipment and personnel decontamination.

Personnel Decontamination

The decontamination procedures, based on Level D protection, will consist of:

- Brushing heavily soiled boots and rinsing outer gloves and boots with soap and water.
- Removing outer gloves and depositing them in a plastic-lined container.
- Washing and rinsing safety suit.
- Removing safety suit and boots. Safety suits are to be deposited in a plastic-lined container.
- Washing and rinsing inner gloves, removing inner gloves, and depositing in a plastic-lined container.

Decontamination procedures will be conducted at the lunch break and at the end of each workday. If the field activity zone is left at other times during the workday, contaminated clothing will be left at the decontamination station on plastic sheeting to be reworn upon returning.

If higher or lower levels of protection are needed, these procedures and an amendment will be adjusted and this HASP amended.

8.0 AUTHORIZED PERSONNEL

Personnel anticipated to be performing field activities at NAS Memphis include:

- E/A&H Project Manager Mr. Robert Moser
- E/A&H Site Safety Officer Mr. Doug Petty
- E/A&H Task Order Manager/
Site Manager Ms. Toleda Burton
- E/A&H Representatives To Be Named

8.1 The Responsibilities of the Site Manager

The site manager will direct the waste stream sampling. The site manager is responsible for the following.

Ensuring all personnel are aware of:

- Names of personnel and alternates responsible for site safety and health.
- Safety, health, and other hazards present onsite.
- Use of PPE and ensuring that the equipment is available.
- Work practices which can minimize risks from hazards.
- Safe use of engineering controls and equipment at each sampling location.
- Medical surveillance requirements including recognition of symptoms and signs which might indicate over-exposure to hazards.

- Site control measures, decontamination procedures, NAS Memphis Standard Operating Procedures, the contingency plan, and responses to emergencies including the necessary PPE.
- Ensuring that all employees have received at least 40 hours of health and safety instruction offsite, and actual field experience under the direct supervision of a trained experienced supervisor. Workers who may be exposed to unique or special hazards will receive additional training.
- Monitoring the performance of personnel to ensure that mandatory health and safety procedures are being performed and correcting any performances that do not comply with the HASP.
- Ensuring that all field personnel employed onsite are covered by a medical surveillance program as required by 29 CFR 1910.120(f):
- Consulting with the Site Safety Officer and/or other personnel.
- Preparing and submitting project reports, including progress, accident, incident, contractual, etc.
- Monitoring personnel decontamination to ensure that all personnel are complying with the established decontamination procedures.

8.2 The Responsibilities of the Site Safety Officer Are as Follows:

- Ensure that a copy of the HASP is maintained nearby during all field activities.

- Advise the Task Order and Site Manager on all health and safety-related matters involved at each sampling location.
- Direct it and ensure that the safety program is being correctly followed in the field, including the proper use of personal protective and site monitoring equipment.
- Ensure that the field personnel observe the appropriate work zones and decontamination procedures.
- Report any safety violations to the site manager.
- Conduct or schedule safety briefings during field activities.

Initially, the Project Health and Safety Officer will be a person trained in safety and industrial hygiene. After the project begins and the Safety Officer has had time to evaluate actual hazardous site conditions, he/she may determine that a member of the project team may assume the duties of Site Safety Officer.

The person responsible for daily health and safety will be trained to use the air monitoring equipment, and to interpret the data collected with the instruments. He or she will also be familiar with symptoms of heat stress and cold exposure, the location and use of safety equipment onsite, and this HASP. The following criteria outline when the Project Health and Safety Officer will be replaced: (1) termination of employment, (2) sickness, (3) end of shift, (4) injury, or (5) death. It should be noted that under revised site work schedules only one shift will be working. As a result, the Project Health and Safety Officer will be responsible for the day shift. Should circumstances arise that require work during other periods, an alternate Site Health and Safety Officer will be designated.

8.3 Responsibilities of Onsite Field Personnel Are as Follows:

- All personnel performing sampling activities must be thoroughly briefed on anticipated hazards and trained on equipment to be worn, safety procedures to be followed, and emergency procedures and communications.
- Required respiratory protective devices and clothing must be worn by all personnel going into areas designated for protective equipment.

9.0 EMERGENCY INFORMATION

All wastestream sampling activities present a risk to onsite personnel. During routine operations, risk can be minimized by establishing good work practices, staying alert, and using PPE. Unpredictable events such as physical injury, chemical exposure, or fire may occur and must be anticipated.

If any situation occurs that requires outside services, E/A&H personnel will contact NAS Memphis. NAS Memphis has a viable EMERGENCY/DISASTER PLAN and the means to respond to fires, explosions, toxic/hazardous material releases, public safety emergencies, severe weather conditions, and bomb threats.

9.1 Site Resources

A telephone for emergency use will be available at each sampling location. Cellular phones will be available for areas without a phone. First aid equipment, including an eye wash facility, will be located at each sampling location. Restrooms and water will be at the office trailer.

9.2 Pre-Emergency Planning

During the site briefings that are to be held daily and at special periodic meetings, all employees will be trained in and reminded of the provisions of the emergency response plan, communications systems, and evacuation routes. This plan will be regularly reviewed and revised, if necessary, the E/A&H Site Safety Officer to ensure that the it is adequate and consistent with prevailing site conditions.

9.3 Personnel Roles and Lines of Authority

The Site Manager has primary responsibility for responding to and assisting NAS Memphis personnel in correcting emergency situations. This includes taking appropriate measures to ensure the safety of site personnel and the public.

9.4 Location of the Nearest Hospital Capable of Treating Chemical Exposures

Methodist North Hospital
3960 Covington Pike
Memphis, Tennessee

Emergency Room Telephone Number — (901) 372-5211

Directions to Methodist North Hospital from NAS Memphis South Gate:

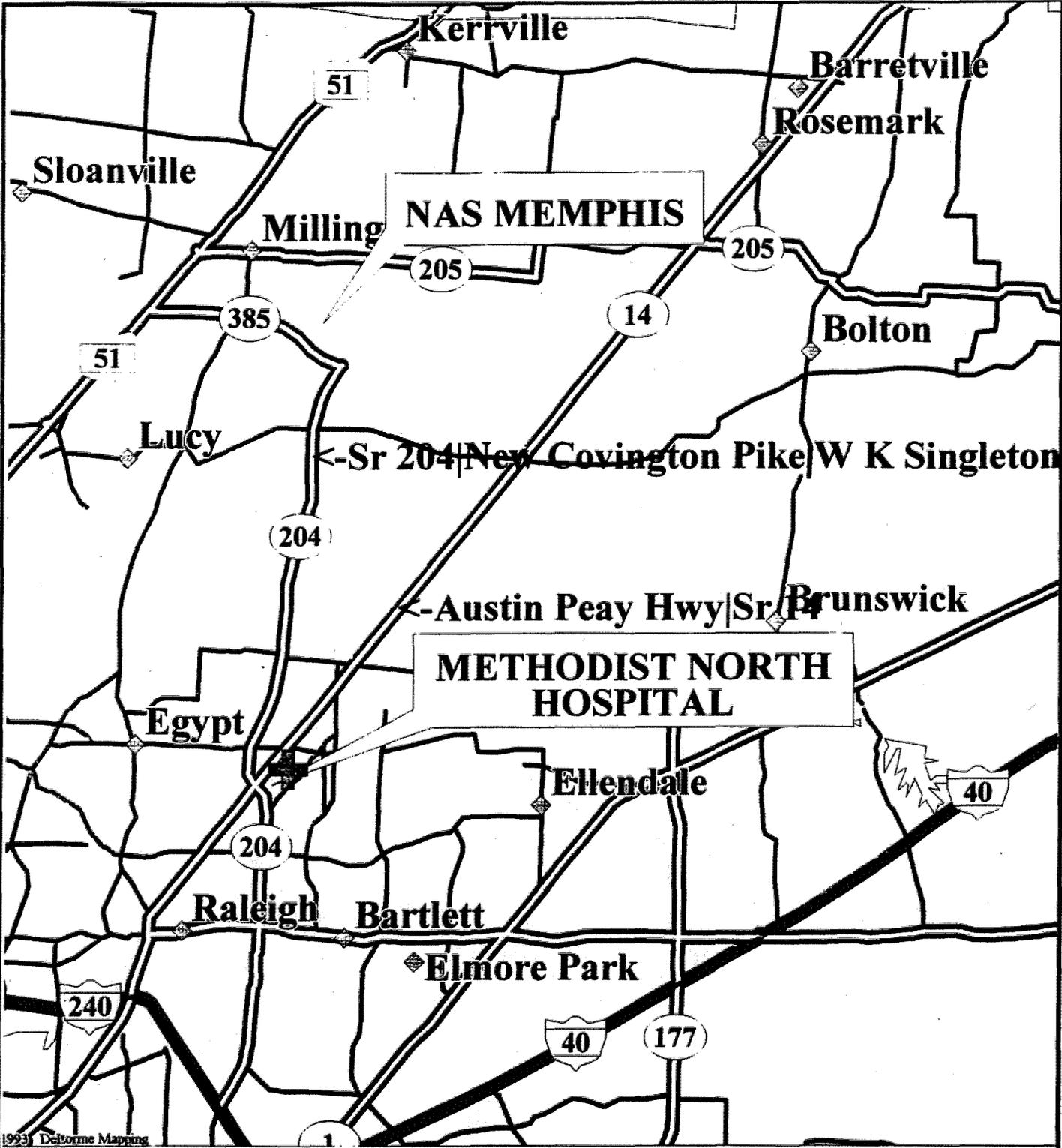
- 1) See Figure 9-1, Medical Emergency Care Map.
- 2) Exit site through South Gate (Singleton Parkway).
- 3) Continue on Singleton Parkway through the stop signs.
- 4) Singleton Parkway and Covington Pike will intersect at a red light (about 5 miles).
- 5) 700 feet past this light on the left, you will see the entrance to the emergency room.

9.5 Emergency Contact/Notification System

Table 9-1 provides names and telephone numbers for emergency contact personnel. In a medical emergency, personnel will take direction from the Site Safety Officer and notify the appropriate emergency organization. **In a fire or spill, the site manager will notify NAS Memphis (873-5500/5509).** The appropriate local, state, and federal agencies will be notified by NAS Memphis.

9.6 Emergency Medical Treatment Procedures

Any person who becomes ill or injured in the exclusion zone must be decontaminated to the maximum extent possible. If the injury or illness is minor, full decontamination should be completed (i.e., completely disrobing the victim and dressing him or her in clean coveralls or wrapping in a blanket). First aid should be administered while waiting for an ambulance or paramedics. **All injuries and illnesses must immediately be reported to the site manager and NAS Memphis security department (9-911).**



HEALTH & SAFETY PLAN
 NAS MEMPHIS
 MILLINGTON, TN

DIRECTIONS TO THE HOSPITAL

DWG DATE: 10/04/94 | DWG NAME: BOARD

Table 9-1 Emergency Contact List		
Contact	Person or Agency Name	Telephone Number
NAS Memphis	Mrs. Tonya Barker	(901) 873-5461
Law Enforcement	NAS Memphis Security	9-911
Fire Department	NAS Memphis Security	9-911
Southern Poison Control Center	—	(901) 528-6048
CHEMTREC	—	1-800-424-9300
EnSafe/Allen & Hoshall Site Manager	Ms. Toleda Burton	(901) 372-7962
EnSafe/Allen & Hoshall Project Manager	Mr. Robert Moser	(901) 372-7962
Primary Hospital Emergency	Naval Hospital, Millington Navy Road Millington, Tennessee 38054-5000	(901) 873-5801/5802

Any person being transported to a clinic or hospital for treatment should take along information on the chemical(s) he or she has been exposed to at the site, or should be accompanied by a person who can provide this information. MSDSs for each chemical constituent will be available at the site in Appendix B of this HASP.

Any vehicle used to transport contaminated personnel will need to be decontaminated as necessary.

9.7 Fire or Explosion

In a fire or explosion, immediately notify NAS Memphis security department (9-911). When the fire commander arrives, the Site Manager will advise the fire commander of the location, nature, and identification of the hazardous materials onsite.

If it is safe to do so, site personnel may:

- Use firefighting equipment available onsite to control or extinguish the fire;
- Remove or isolate flammable or other hazardous materials which may contribute to the fire.

If it is not safe to take the above actions, the work area must be evacuated.

9.8 Spills or Leaks

In the event of a spill or leak, site personnel will:

- Inform the Site Manager immediately;
- Locate the source of the spillage and stop the flow if it can be done safely;
- If required, summon NAS Memphis HAZMAT Team (9-911).

Appendix A
Health and Safety Plan Acceptance Form

PLAN ACCEPTANCE FORM

PROJECT HEALTH AND SAFETY PLAN

INSTRUCTIONS: This form is to be completed by each person working on the project site and returned to: EnSafe/Allen & Hoshall, Memphis, Tennessee.

Job No: CTO — 092

Contract No: N62467-89-D-0318

Project: Waste Characterization Study — NAS Memphis

I have read and understand the contents of the above plan and agree to perform my work in accordance with it.

Signed

Print Name

Company

Date

APPENDIX B

MATERIAL SAFETY DATA SHEETS

MSDS LIST

Methylene Chloride (Dichloromethane)

Naphtha

Phosphoric Acid

Kerosene

Sulfuric Acid

Lubricating Oil

Xylene

Formaldehyde

Stoddard Solvent

Ethylene Glycol

Freon

Lead

1,1,1-Trichloroethane (Methyl Chloroform)

Isopropyl Alcohol

Sodium Hypochlorite

ODOR DETECTED AT (ppm): PHOSGENE ■SAX.
214 PPM
ODOR DESCRIPTION: SWEETISH (LIKE CHLOROFORM OR ETHER)
Source: NYDH
100 % ODOR DETECTION: No data

----- REGULATIONS -----

DOT hazard class: 6.1 POISON
DOT guide: 74
Identification number: UN1593
DOT shipping name: Dichloromethane
Packing group: III
Label(s) required: KEEP AWAY FROM FOOD
Special provisions: N36, T13
Packaging exceptions: 173.153
Non bulk packaging: 173.203
Bulk packaging: 173.241
Quantity limitations-
Passenger air/rail: 60 L
Cargo aircraft only: 220 L
Vessel stowage: A
Other stowage provisions:

STCC NUMBER: 4941132

CLEAN WATER ACT Sect.307: Yes
CLEAN WATER ACT Sect.311: No

Additional Primary Drinking Water Regulations

Maximum Contaminant Levels (MCL): 0.005 mg/L (01/17/94)
Maximum Contaminant Level Goals (MCLG): 0 mg/L (01/17/94)

CLEAN AIR ACT: CAA '90 Listed
EPA WASTE NUMBER: U080
CERCLA REF: Y
RQ DESIGNATION: C 1000 pounds (454 kg) CERCLA
SARA TPQ VALUE: Not listed
SARA Sect. 312
categories:

Acute toxicity: Toxic. LD50 > 50 and <= 500 mg/kg (oral rat).
Acute toxicity: Irritant
Acute toxicity: adverse effect to target organs.
Chronic toxicity: carcinogen
Chronic toxicity: adverse effect to target organ after long period of exposure.
Chronic toxicity: mutagen.
Chronic toxicity: reproductive toxin.

LISTED IN SARA Sect 313: Yes
de minimus CONCENTRATION: 0.1 percent

UNITED STATES POSTAL SERVICE MAILABILITY:

Hazard class: ORM-A
Mailability: Domestic service and air transportation shipper's declaration
Weight per parcel: 10 GAL; 1 PT

NFPA CODES:

HEALTH HAZARD (BLUE): (2) Hazardous to health. Area may be entered with self-contained breathing apparatus.
FLAMMABILITY (RED) : (1) This material must be preheated before ignition can occur.
REACTIVITY (YELLOW): (0) Stable even under fire conditions.
SPECIAL : Unspecified

----- SUMMARY OF REGULATORY LISTS THIS SUBSTANCE APPEARS ON -----

ACGIH TLV list "Threshold Limit Values for 1992-1993"
ATSDR Toxicology Profile available (NTIS** PB/89/194468/AS)
California Assembly Bill 1803 Well Monitoring Chemicals.
California Assembly Bill 2588 Air Toxics "Hot Spots" Chemicals.
California Department of Health Services Drinking Water Action List.
California Assembly Bill 1807 Toxic Air Contaminants.
Canadian Domestic Substances List
Canadian Ingredient Disclosure List. 20/01/88 Canada Gazette part II, Vol 122.
Clean Air Act Section 111 List.
Clean Air Act of November 15, 1990. List of pollutants.
Clean Water Act Section 307 Priority Pollutants
DICHLOROMETHANE [75-09-2]
DOT Hazardous Materials Table. 49 CFR 172.101
EPA Carcinogen Assessment Group List
EPA List of VOC chemicals from 40 CFR 60.489
EPA Office of Pesticide Programs. List of active ingredients, 24 April, 1989.
EPA TSCA 8(a) Preliminary Assessment Information Rule - effective 11/19/82
EPA TSCA 8(d) Health and Safety Data Rule - effective date 10/04/82
EPA TSCA Chemical Inventory List 1986
EPA TSCA Chemical Inventory List 1989
EPA TSCA Chemical Inventory List 1990
EPA TSCA Chemical Inventory List 1992
EPA TSCA Test Submission (TSCATS) Database - April 1990
EPA TSCA Test Submission (TSCATS) Database - September 1989
Massachusetts Substance List.
National Toxicology Program list of anticipated human carcinogens
New Jersey DEQ100 list for release reporting.
New Jersey Right To Know Substance List. (December 1987)
OSHA Air Contaminant (Table Z-1-A). 54 FR 4332, Jan. 19, 1989 and revised.
Pennsylvania Hazardous Substance List
RCRA Hazardous Constituents for Ground Water Monitoring. Ap'dx IX to 40 CFR 264
RCRA Hazardous Waste
SARA Section 110 Priority List of CERCLA Hazardous Substances
SARA Section 313 Toxic Chemicals List
Superfund/CERCLA RQ list. Table 302.4 in 54 FR 50968 (December 11, 1989)
Suspected carcinogen (ACGIH). "Threshold Limit Values for 1992-1993"
Washington State Discarded Chemical Products List, November 17, 1989
Wisconsin Air Toxics Control Regulation NR-445 (December 1988)

----- TOXICITY DATA -----

SHORT TERM TOXICITY: INHALATION: levels of 300-700 ppm for 3-5 hours has caused slight loss of muscle control and coordination. effects of higher concentrations include stupor, dizziness, chest pain, arm and leg pains, loss of feeling, loss of appetite, hot flashes and death. SKIN: may be irritating if confined on the skin by gloves or clothing. may be absorbed slowly through the skin to cause symptoms listed under inhalation. Eyes: may cause pain, irritation and burns. INGESTION: accidental ingestion of paint removers containing methylene chloride as the main ingredient have reportedly caused headache, nausea, vomiting, visual disturbance, presence of blood in the urine, and unconsciousness. (NYDH)

LONG TERM TOXICITY: same symptoms as above. prolonged exposure can cause changes in blood, hallucinations and decreased response to visual and auditory stimulation. some long term exposures have also resulted in damage to the liver. most of the effects will disappear after exposure stops. methylene chloride caused genetic effects in certain bacteria and caused birth defects in chickens. in laboratory studies, methylene chloride has also been shown to cause tumors in mice and rats. whether methylene chloride causes defects or tumors in humans is not known. (NYDH)

TARGET ORGANS: skin, cvs, eyes, CNS

SYMPTOMS: INHALATION: anesthetic effects, nausea and drunkenness. CONTACT WITH SKIN AND EYES: skin irritation, irritation of eyes and nose. Source: CHRIS

CONC IDLH: 5000PPM

NIOSH REL: Potential occupational carcinogen --LOWEST FEASIBLE

ACGIH TLV: TLV = 50ppm Suspected human carcinogen (A2)

ACGIH STEL: Not listed

OSHA PEL: Transitional Limits:

PEL = 500 PPM; CEILING = 1000 PPM; MAXIMUM PEAK FOR 5 MINUTE

Final Rule Limits:

TWA = 500 ppm

CEILING = 1000 PPM; MAXIMUM PEAK ABOVE CEILING FOR 5 MINUTES

MAK INFORMATION: 100 ppm
360 mg/M3

Substance with systemic effects, onset of effect less than or equal to 2 hrs: Peak = 5xMAK for 30 minutes, 2 times per shift of 8 hours.

CARCINOGEN?: Y STATUS: See below

CARCINOGEN LISTS:

IARC: Carcinogen defined by IARC to be possibly carcinogenic to humans, but having (usually) no human evidence.
MAK: Not listed
NIOSH: Carcinogen defined by NIOSH with no further categorization.
NTP: Carcinogen defined by NTP as reasonably anticipated to be carcinogenic, with limited evidence in humans or sufficient evidence in experimental animals.
ACGIH: Carcinogen defined by ACGIH TLV Committee as a suspected carcinogen, based on either limited epidemiological evidence or demonstration of carcinogenicity in experimental animals.
OSHA: Not listed

HUMAN TOXICITY DATA: (Source: NIOSH RTECS)

orl-hmn LDLo:357 mg/kg 34ZIAG -,390,69
PERIPHERAL NERVE AND SENSATION
Paresthesia
BEHAVIORAL
Somnolence (general depressed activity)
BEHAVIORAL
Convulsions or effect on seizure threshold

ihl-hmn TCLo:500 ppm/1Y-I ABHYAE 43,1123,68
BEHAVIORAL
Altered sleep time (including change in righting reflex)
BEHAVIORAL
Somnolence (general depressed activity)
CARDIAC
Change in rate

LD50 value: orl-rat LD50:1600 mg/ kg

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1992)

orl-rat LD50:1600 mg/kg
ihl-rat LC50:88 gm/m3/30M
ipr-rat LD50:916 mg/kg
ihl-mus LC50:14400 ppm/7H
ipr-mus LD50:437 mg/kg

scu-mus LD50:6460 mg/kg
unr-mus LD50:4770 mg/kg
orl-dog LDLo:3 gm/kg
ihl-dog LCLo:14108 ppm/7H
ipr-dog LDLo:950 mg/kg
ivn-dog LDLo:200 mg/kg
ihl-cat LCLo:43400 mg/m3/4.5H
orl-rbt LDLo:1900 mg/kg
ihl-rbt LCLo:10000 ppm/7H
scu-rbt LDLo:2700 mg/kg
ihl-gpg LCLo:5000 ppm/2H

IRRITATION DATA: (Source: NIOSH RTECS 1992)

skn-rbt 810 mg/24H SEV
eye-rbt 162 mg MOD
eye-rbt 10 mg MLD

Reproductive toxicity (1992 RTECS):

This chemical is a mammalian reproductive toxin.

REPRODUCTIVE TOXICITY DATA (1992 RTECS)

ihl-rat TCLo:4500 ppm/24H (1-17D preg) TXAPA9 52,29,80
EFFECTS ON NEWBORN
Behavioral

ihl-rat TCLo:1250 ppm/7H (6-15D preg) TXAPA9 32,84,75
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Urogenital system

California Prop 65: Carcinogen (04/01/88)
No significant risk level-inhalation 200. ugD (01/01/94)
No significant risk level 50. ugD (01/01/94)

----- EPA's IRIS DATA SUMMARY -----
Dichloromethane; CASRN 75-09-2 (04/01/92)

_II. CARCINOGENICITY ASSESSMENT FOR LIFETIME EXPOSURE

Substance Name -- Dichloromethane
CASRN -- 75-09-2
Primary Synonym -- Methylene Chloride
Last Revised -- 01/01/91

Section II provides information on three aspects of the carcinogenic risk assessment for the agent in question; the U.S. EPA classification, and quantitative estimates of risk from oral exposure and from inhalation exposure. The classification reflects a weight-of-evidence judgment of the likelihood that the agent is a human carcinogen. The quantitative risk estimates are presented in three ways. The slope factor is the result of application of a low-dose extrapolation procedure and is presented as the risk per (mg/kg)/day.

The unit risk is the quantitative estimate in terms of either risk per ug/L drinking water or risk per ug/cu.m air breathed. The third form in which risk is presented is a drinking water or air concentration providing cancer risks 1 in 10,000, 1 in 100,000 or 1 in 1,000,000. Background Document 2 (Service Code 5) provides details on the rationale and methods used to derive the carcinogenicity values found in IRIS. Users are referred to Section I for information on long-term toxic effects other than carcinogenicity.

__II.A. EVIDENCE FOR CLASSIFICATION AS TO HUMAN CARCINOGENICITY

___II.A.1. WEIGHT-OF-EVIDENCE CLASSIFICATION

Classification --B2; probable human carcinogen

Basis -- Based on inadequate human data and sufficient evidence of carcinogenicity in animals; increased incidence of hepatocellular neoplasms and alveolar/bronchiolar neoplasms in male and female mice, and increased incidence of benign mammary tumors in both sexes of rats, salivary gland sarcomas in male rats and leukemia in female rats. This classification is supported by some positive genotoxicity data, although results in mammalian systems are generally negative.

___II.A.2. HUMAN CARCINOGENICITY DATA

Inadequate. Neither of two studies of chemical factory workers exposed to dichloromethane showed an excess of cancers (Ott et al., 1983; Friedlander et al., 1978; Hearne and Friedlander, 1981). The Ott et al. (1983) study was designed to examine cardiovascular effects, and consequently the study period was too short to allow for latency of site-specific cancers. In the Friedlander et al. (1978) study, exposures were low, but the data provided some suggestion of an increased incidence of pancreatic tumors. This study was recently updated to include a larger cohort, followed through 1984, and an investigation of possible confounding factors (Hearne et al., 1986, 1987). A nonsignificant excess in pancreatic cancer deaths was observed, which was interpreted by EPA (1987a) as neither clear evidence of carcinogenicity in humans, nor evidence of noncarcinogenicity. An update of the Ott et al. (1983) study, based on longer follow-up, indicated possible elevation of liver and biliary tract cancers (TSCA section 8(e) submission no. 8eHQ-0198-0772 FLWP et seq., 1989).

___II.A.3. ANIMAL CARCINOGENICITY DATA

Sufficient. Dichloromethane administered in the drinking water induced a significant increase in combined hepatocellular carcinoma and neoplastic nodules in female F344 rats and a nonsignificant increase in combined hepatocellular carcinoma and neoplastic nodules in male B6C3F1 mice (NCA, 1982, 1983). Two inhalation studies with dichloromethane have shown an

increased incidence of benign mammary tumors in both sexes of Sprague-Dawley (Burek et al., 1984) and F344 (NTP, 1986) rats. Male Sprague-Dawley rats had increased salivary gland sarcoma (Burek et al., 1984) and female F344 rats had increased leukemia incidence (NTP, 1986). Both sexes of B6C3F1 mice developed liver and lung tumors after dichloromethane treatment (NTP, 1986).

In a 2-year study by the National Coffee Association (1982, 1983), groups of 85 F344 rats/sex/dose received 5, 50, 125, or 250 (mg/kg)/day of dichloromethane in the drinking water. Control groups consisted of 135 rats/sex. In female rats the incidence of combined hepatocellular carcinoma and neoplastic nodules was statistically significantly increased in the 50 and 250 mg/kg dose groups when compared with matched controls (0/134, 1/85, 4/83, 1/85, and 6/85 in the five dose groups 0, 5, 50, 125, and 250 (mg/kg)/day, respectively). The incidence of hepatocellular carcinoma alone was not significantly increased (0/134, 0/85, 2/83, 0/85, 2/85). The combined incidence of hepatocellular carcinoma and neoplastic nodules in controls and the 4 dose groups (472 rats: 4 with carcinoma and 8 with neoplastic nodules) was similar to that for historical controls (419 rats; 5 with carcinoma, 19 with neoplastic nodules). Male rats showed no increase in liver tumors.

In the same National Coffee Association study (1982, 1983), B6C3F1 mice received 0, 60, 125, 185, or 250 (mg/kg)/day of dichloromethane in drinking water. Treatment groups consisted of 50 female mice and 200, 100, 100, and 125 male mice (low to high dose). One hundred females and 125 males served as controls. Male mice had an increased incidence of combined neoplastic nodules and hepatocellular carcinoma (24/125, 51/200, 30/100, 31/99, 35/125). The increase was not dose-related, but the pairwise comparisons for the two mid-dose groups were reported to be statistically significant (U.S. EPA, 1985a). The hepatocellular carcinoma incidence alone for male mice (which was about 55-65% of the total) was not significantly elevated. Female mice did not have increased liver tumor incidence. The EPA (1985b) regarded this study as suggestive but not conclusive evidence for carcinogenicity of dichloromethane.

A gavage bioassay of dichloromethane conducted by NTP (1982) has not been published because of high mortality, much of which was attributed to gavage accidents.

Inhalation exposure of 107 to 109 Syrian hamsters/sex/dose to 0, 500, 1500, or 3500 ppm of dichloromethane for 6 hours/day, 5 days/week for 2 years did not induce neoplasia (Burek et al., 1984). Sprague-Dawley rats (129/sex/dose) were exposed under the same conditions. Female rats administered the highest dose experienced significantly reduced survival from 18-24 months. Female rats showed a dose-related increase in the average number of benign mammary tumors per rat (1.7, 2.3, 2.6, 3.0), although the numbers of rats with tumors were not significantly increased. A similar response was observed in male rats, but to a lesser degree. In the male rats there was a statistically significant positive trend in the incidence of sarcomas of the salivary gland (1/93, 0/94, 5/91, 11/88); the incidence was significantly elevated at the high dose. There is a question as to whether these doses reached the MTD, particularly in the hamsters and the male rats. In another study (Dow Chemical Co., 1982), 90 Sprague-Dawley rats/sex were exposed by inhalation to 0, 50, 200, or 500 ppm dichloromethane for 20 months (male) or 24 months (female). No salivary tumors were observed, but there was an exposure-related

increase in the total number of benign mammary tumors in female rats, although the increase was not statistically significant in any individual exposure group.

Groups of 50 each male and female F344/N rats and B6C3F1 mice were exposed to dichloromethane by inhalation, 6 hours/day, 5 days/week for 2 years (NTP, 1986). Exposure concentrations were 0, 1000, 2000, or 4000 ppm for rats and 0, 2000, or 4000 ppm for mice. Survival of male rats was low; however, this apparently was not treatment-related. Survival was decreased in a treatment-related fashion for male and female mice and female rats. Mammary adenomas and fibroadenomas were significantly increased in male and female rats after survival adjustment, as were mononuclear cell leukemias in female rats. Among treated mice of both sexes there were significantly increased incidences of hepatocellular adenomas and carcinomas, and of alveolarbronchiolar adenomas and carcinomas, by life table tests. Adenomas and carcinomas were significantly increased alone as well as in combination. In addition, there were significant dose-related increases in the number of lung tumors per animal multiplicity in both sexes of mice.

Two inhalation assays using dogs, rabbits, guinea pigs, and rats showed no tumors, but were not conducted for the lifetime of the animals (Heppel et al., 1944; MacEwen et al., 1972). Theiss et al., (1977) injected Strain A male mice intraperitoneally with 0, 160, 400, or 800 mg/kg of dichloromethane 16 to 17 times, over 5 to 6 weeks. Survival of the animals was poor. The animals remaining 24 weeks after the first treatment were killed and examined for lung tumors; pulmonary adenomas were found.

II.A.4. SUPPORTING DATA FOR CARCINOGENICITY

Dichloromethane was mutagenic for Salmonella typhimurium with or without the addition of hepatic enzymes (Green, 1983) and produced mitotic recombination in yeast (Callen et al., 1980). Results in cultured mammalian cells have generally been negative, but dichloromethane has been shown to transform rat embryo cells and to enhance viral transformation of Syrian hamster embryo cells (Price et al., 1978; Hatch et al., 1983). Although chlorinated solvents have often been suspected of acting through a nongenotoxic mechanism of cell proliferation, Lefevre and Ashby (1989) found methylene chloride to be unable to induce hepatocellular division in mice.

II.B. QUANTITATIVE ESTIMATE OF CARCINOGENIC RISK FROM ORAL EXPOSURE

II.B.1. SUMMARY OF RISK ESTIMATES

Oral Slope Factor -- $7.5E-3$ per (mg/kg)/day

Drinking Water Unit Risk -- $2.1E-7$ per (ug/L)

Extrapolation Method -- Linearized multistage procedure, extra risk

Drinking Water Concentrations at Specified Risk Levels:

Risk Level	Concentration
E-4 (1 in 10,000)	5E+2 ug/L
E-5 (1 in 100,000)	5E+1 ug/L
E-6 (1 in 1,000,000)	5E+0 ug/L

II.B.2. DOSE-RESPONSE DATA (CARCINOGENICITY, ORAL EXPOSURE)

Tumor Type -- hepatocellular adenomas or carcinomas (NTP) and hepatocellular can
Test Animals -- mouse/B6C3F1 (female, NTP; male, NCA)
Route -- inhalation (NTP); drinking water (NCA)
Reference -- NTP, 1986; National Coffee Association (NCA), 1983

Dose

Administered (ppm)	mg/kg/day	Human Equivalent (mg/kg)/day	Tumor Incidence	Reference
0	0	0	3/50	NTP, 1986
2000	1582	122	16/48	
3000	3162	244	40/48	
	0	0	24/125	NCA, 1983
	60	4.5	51/200	
	125	9.4	30/100	
	185	14.0	31/99	
	250	18.9	35/125	

II.B.3. ADDITIONAL COMMENTS (CARCINOGENICITY, ORAL EXPOSURE)

The slope factor is an arithmetic mean of slope factors derived from NTP(1986) and the National Coffee Association (1983) data, 2.6E-3 per (mg/kg)/day and 1.2E-2 per (mg/kg)/day, respectively. The use of liver tumor data from the NTP inhalation bioassay was considered valid since dichloromethane is rapidly absorbed following either inhalation or ingestion.

Dose conversions used the mean body weight for female mice at the midpoint of the bioassay, and an estimated inhalation rate of 0.0407 cu.m/day. To obtain estimates of unit risk for humans, an inhalation rate of 20 cu.m/day was assumed. Dichloromethane was considered to be well-absorbed as a vapor at low doses. No pharmacokinetic or metabolism data have been used to modify the oral unit risk estimate, because such analyses have not yet been carried out.

The unit risk should not be used if the water concentration exceeds 5E+4 ug/L, since above this concentration the unit risk may not be appropriate.

___II.B.4. DISCUSSION OF CONFIDENCE (CARCINOGENICITY, ORAL EXPOSURE)

Adequate numbers of animals were used in both assays. Risk estimates were based on the more sensitive sex in each study. The two risk estimates were within a factor of 5.

___II.C. QUANTITATIVE ESTIMATE OF CARCINOGENIC RISK FROM INHALATION EXPOSURE

___II.C.1. SUMMARY OF RISK ESTIMATES

Inhalation Unit Risk -- 4.7E-7 per (ug/cu.m)

Extrapolation Method -- Linearized multistage procedure, extra risk

Air Concentrations at Specified Risk Levels:

Risk Level	Concentration
E-4 (1 in 10,000)	2E+2 ug/cu.m
E-5 (1 in 100,000)	2E+1 ug/cu.m
E-6 (1 in 1,000,000)	2E+0 ug/cu.m

___II.C.2. DOSE-RESPONSE DATA FOR CARCINOGENICITY, INHALATION EXPOSURE

Tumor Type -- combined adenomas and carcinomas
Test Animals -- mouse/B6C3F1, female
Route -- inhalation
Reference -- NTP, 1986

Tumor Type	Dose			Tumor Incidence
	Administered (ppm)	Transformed Animal (mg/kg)/day	Human Equivalent (mg/kg)/day	
Liver	0	0	0	3/45
	2000	1582	356	16/46
	4000	3162	712	40/46
Lung	0	0	0	3/45

2000
4000

1582
3162

356
712

30/46
41/46

___II.C.3. ADDITIONAL COMMENTS (CARCINOGENICITY, INHALATION EXPOSURE)

The unit risk of $4.7E-7$ per (ug/cu.m), which incorporates information on pharmacokinetics and metabolism of dichloromethane, is approximately nine-fold lower than the previous applied dose estimate (U.S. EPA, 1987a,b). Internal dose estimates were based on the metabolism of dichloromethane by the glutathione-s-transferase pathway, as estimated by the model developed by Andersen et al. (1987). The internal dose was corrected for interspecies differences in sensitivity by using the surface area correction factor.

Calculation of a slope factor from the unit risk is inappropriate when pharmacokinetic models are used. (When dose-response relationships are figured on the basis of internal or metabolized dose, a slope factor in terms of per (mg/kg)/day represents a back calculation using different absorption assumptions than the pharmacokinetic models. This introduces possible contradictions.)

The unit risk should not be used if the air concentration exceeds $2E+4$ ug/cu.m, since above this concentration the unit risk may differ from that stated. Since the unit risk is based on a pharmacokinetic model, the risk may change with alterations in exposure patterns. Thus, the unit risk presented here may not be applicable to acute, high exposures.

___II.C.4. DISCUSSION OF CONFIDENCE (CARCINOGENICITY, INHALATION EXPOSURE)

Adequate numbers of animals were observed and tumor incidences were significantly increased in a dose-dependent fashion. Analysis excluding animals that died before observation of the first tumors produced similar risk estimates, as did time-to-tumor analysis. The use of animal and human metabolism and pharmacokinetic data reduces some of the uncertainty typically associated with dose-risk extrapolation. A great deal of uncertainty still exists, however, in the estimates of internal dose generated by the model of Andersen et al. (1987). Important uncertainties remain regarding the pharmacokinetics, pharmacodynamics, and mechanisms of carcinogenicity for dichloromethane.

___II.D. EPA DOCUMENTATION, REVIEW, AND CONTACTS (CARCINOGENICITY ASSESSMENT)

___II.D.1. EPA DOCUMENTATION

U.S. EPA. 1985a. Health Assessment Document for Dichloromethane (Methylene Chloride). Final Report. Office of Health and Environmental Assessment, Washington, D.C. EPA/600/8-82/004F.

U.S. EPA. 1985b. Addendum to the Health Assessment Document for Dichloromethane (methylene chloride). Updated carcinogenicity assessment. Prepared by the Carcinogen Assessment Group, OHEA, Washington, DC. EPA/600/8-82/004FF.

U.S. EPA. 1987a. Update to the Health Assessment Document and Addendum for Dichloromethane (Methylene Chloride): Pharmacokinetics, Mechanism of Action and Epidemiology. Review Draft. Office of Health and Environmental Assessment, Washington, DC. EPA/600/8-87/030A.

U.S. EPA. 1987b. Technical Analysis of New Methods and Data Regarding Dichloromethane Hazard Assessments. Review Draft. Office of Health and Environmental Assessment, Washington, DC. EPA/600/8-87/029A.

II.D.2. REVIEW (CARCINOGENICITY ASSESSMENT)

The Addendum to the Health Assessment Document, the Update to the Health Assessment Document and Addendum, and the Technical Analysis of New Methods and Data for dichloromethane have received Agency and external review, including a review by the Science Advisory Board (SAB). Although the last two documents are not yet finalized and the SAB comments are not yet incorporated, these do not alter this document's analyses or conclusions.

Agency Work Group Review: 11/12/86, 12/04/86, 04/06/89

Verification Date: 04/06/89

II.D.3. U.S. EPA CONTACTS (CARCINOGENICITY ASSESSMENT)

Lorenz Rhomberg / ORD -- (202)260-5723 / FTS 260-5723

Dharm V. Singh / ORD -- (202)260-5898 / FTS 260-5898

----- PROTECTION AND FIRST AID -----

PROTECTION SUGGESTED
FROM THE CHRIS MANUAL:
organic vapor canister mask, safety glasses, protective clothing.

NIOSH POCKET GUIDE TO CHEMICAL HAZARDS:

** WEAR APPROPRIATE EQUIPMENT TO PREVENT:
Repeated or prolonged skin contact.

** WEAR EYE PROTECTION TO PREVENT:
Reasonable probability of eye contact.

EXPOSED PERSONNEL SHOULD WASH:
Promptly when skin becomes wet.

** REMOVE CLOTHING:
Promptly remove non-impervious clothing that becomes wet.

** REFERENCE: NIOSH

RECOMMENDED RESPIRATION PROTECTION Source: NIOSH POCKET GUIDE (85-114)
NIOSH (DICHLOROMETHANE)

750 ppm: Any supplied-air respirator. * Substance reported to cause eye irritation or damage may require eye protection. / Any self-contained breathing apparatus. * Substance reported to cause eye irritation or damage may require eye protection.

1875 ppm: Any supplied-air respirator operated in a continuous flow mode. * Substance reported to cause eye irritation or damage may require eye protection.

3750 ppm: Any self-contained breathing apparatus with a full facepiece. / Any supplied-air respirator with a full facepiece.

5000 ppm: Any supplied-air respirator with a full facepiece and operated in a pressure-demand or other positive pressure mode.

EMERGENCY OR PLANNED ENTRY IN UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS.:
Any self-contained breathing apparatus with full facepiece and operated in a pressure-demand or other positive pressure mode. / Any supplied-air respirator with a full facepiece and operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.

ESCAPE: Any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister. / Any appropriate escape-type self-contained breathing apparatus.

FIRST AID SOURCE: CHRIS Manual 1991

INHALATION: remove from exposure. Give oxygen if needed.

INGESTION: no specific antidote. CONTACT WITH
SKIN AND

EYES: remove contaminated clothing; wash skin or eyes if affected.

FIRST AID SOURCE: DOT Emergency Response Guide 1990.

Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen. In case of contact with material, immediately flush eyes with running water for at least 15 minutes. Wash skin with soap and water. Remove and isolate contaminated clothing and shoes at the site. Use first aid treatment according to the nature of the injury.

----- INITIAL INCIDENT RESPONSE -----

FIRE EXTINGUISHMENT: USE WATER SPRAY TO KEEP FIRE-EXPOSED CONTAINERS

COOL AND TO FLUSH SPILLAGE TO AVOID FURTHER EXPOSURES. Note: CHRIS91

Department of Transportation Guide to Hazardous Materials Transport Information - Publication DOT 5800.5 (1990).

DOT SHIPPING NAME: Dichloromethane

DOT ID NUMBER: UN1593

ERG93

GUIDE 74

POTENTIAL HAZARDS

*HEALTH HAZARDS

Vapors may cause dizziness or suffocation.
Exposure in an enclosed area may be very harmful.
Contact may irritate or burn skin and eyes.
Fire may produce irritating or poisonous gases.
Runoff from fire control or dilution water may cause pollution.

*FIRE OR EXPLOSION

Some of these materials may burn, but none of them ignites readily.
Most vapors heavier than air.

*Air/vapor mixtures may explode when ignited.

Container may explode in heat of fire.

EMERGENCY ACTION

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind, out of low areas, and ventilate closed spaces before entering. Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection. *Isolate for 1/2 mile in all directions if tank, rail car or tank truck is involved in fire. Remove and isolate contaminated clothing at the site. CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, CALL CHEMTREC AT 1-800-424-9300. If water pollution occurs, notify the appropriate authorities.

*FIRE

Small Fires: Dry chemical or CO2.

Large Fires: Water spray, fog or regular foam.

Apply cooling water to sides of containers that are exposed to flames until well after fire is out. Stay away from ends of tanks.

*SPILL OR LEAK

Shut off ignition sources; no flares, smoking or flames in hazard area. Stop leak if you can do it without risk.

Small Liquid Spills: Take up with sand, earth or other noncombustible absorbent material.

Large Spills: Dike far ahead of liquid spill for later disposal.

*FIRST AID

Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen. In case of contact with material, immediately flush eyes with running water for at least 15 minutes. Wash skin with soap and water. Remove and isolate contaminated clothing and shoes at the site. Use first aid treatment according to the nature of the injury.

DISCLAIMER: The data shown above on this chemical represents a best effort on the part of the compilers of the CHEMTOX database to obtain useful; accurate, and factual data. The use of these data shall be in accordance with the delines and limitations of the user's CHEMTOX license agreement. The COMPILERS of the CHEMTOX database shall not be held liable for inaccuracies or omissions within this database, or in any of its printed or displayed output forms.

DOT guide: 27
Identification number: UN1256
DOT shipping name: Naphtha, [solvent]
Packaging group: II - III
Label(s) required: FLAMMABLE LIQUID - FLAMMABLE LIQUID
Special provisions: T8, T31, B1, T7, T30
Packaging exceptions: 173.150, 150
Non bulk packaging: 173.202, 203
Bulk packaging: 173.242, 242
Quantity limitations-
Passenger air/rail: 5 L, 60 L
Cargo aircraft only: 60 L, 220 L
Vessel stowage: B, A
Other stowage provisions:

STCC NUMBER: 4915241, 4910241

CLEAN WATER ACT Sect.307: No
CLEAN WATER ACT Sect.311: No
CLEAN AIR ACT: Not listed
EPA WASTE NUMBER: D001
CERCLA REF: Not listed
RQ DESIGNATION: Not listed
SARA TPQ VALUE: Not listed
SARA Sect. 312
categories:

Fire hazard: flammable.

UNITED STATES POSTAL SERVICE MAILABILITY:
Not given

NFPA CODES:
HEALTH HAZARD (BLUE): Unspecified
FLAMMABILITY (RED): Unspecified
REACTIVITY (YELLOW): Unspecified
SPECIAL: Unspecified

----- SUMMARY OF REGULATORY LISTS THIS SUBSTANCE APPEARS ON -----

Canadian Domestic Substances List
DOT Hazardous Materials Table. 49 CFR 172.101
EPA TSCA Chemical Inventory List 1989
EPA TSCA Chemical Inventory List 1990
EPA TSCA Chemical Inventory List 1992
EPA TSCA Test Submission (TSCATS) Database - April 1990
EPA TSCA Test Submission (TSCATS) Database - September 1989
Massachusetts Substance List.
NAPHTHA, SOLVENT [8030-30-6]
New Jersey Right To Know Substance List. (December 1987)

Pennsylvania Hazardous Substance List
RCRA Hazardous Waste

----- TOXICITY DATA -----

SHORT TERM TOXICITY: Unknown

LONG TERM TOXICITY: unknown

TARGET ORGANS:

SYMPTOMS: Source:

CONC IDLH: Nonegiven

NIOSH REL:

ACGIH TLV: Not listed

ACGIH STEL: Not listed

OSHA PEL: Not in Table Z-1-A

MAK INFORMATION: ppm
mG/M3

CARCINOGEN?: N STATUS: See below

CARCINOGEN LISTS:

IARC: Not listed
MAK: Not listed
NIOSH: Not listed
NTP: Not listed
ACGIH: Not listed
OSHA: Not listed

HUMAN TOXICITY DATA: (Source: NIOSH RTECS)
* ihl-hmn LCLO:3 pph/5M TABIA2 3,231,33

LD50 value: orl-rat LD50:>5 gm/ kg

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1992)

orl-rat LD50:>5 gm/kg
ihl-rat LCLO:1600 ppm/6H
ihl-mus LCLO:10600 mg/m3/6H
skn-rbt LD50:>3 gm/kg
ipr-mam LDLo:2500 mg/kg

IRRITATION DATA: (Source: NIOSH RTECS 1992)

Reproductive toxicity (1992 RTECS):

This chemical has no known mammalian reproductive toxicity.

REPRODUCTIVE TOXICITY DATA (1992 RTECS)

California Prop 65: Not listed

----- PROTECTION AND FIRST AID -----

PROTECTION SUGGESTED
FROM THE CHRIS MANUAL:

RECOMMENDED RESPIRATION PROTECTION Source: NIOSH POCKET GUIDE (85-114)
OSHA (NAPHTHA, SOLVENT)

1000 ppm: Any powered air-purifying respirator with organic vapor cartridge(s). * Substance causes eye irritation or damage; eye protection needed. / Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s).

2500 ppm: Any supplied-air respirator operated in a continuous flow mode. * Substance causes eye irritation or damage; eye protection needed.

5000 ppm: Any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister. / Any self-contained breathing apparatus with a full facepiece. / Any supplied-air respirator with a full facepiece.

10000 ppm: Any supplied-air respirator with a full facepiece and operated in a pressure-demand or other positive pressure mode.

EMERGENCY OR PLANNED ENTRY IN UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS.: Any self-contained breathing apparatus with full facepiece and operated in a pressure-demand or other positive pressure mode. / Any supplied-air respirator with a full facepiece and operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.

ESCAPE: Any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister. / Any appropriate escape-type self-contained breathing apparatus.

FIRST AID SOURCE: NIOSHP

EYE: None given

SKIN: None given

INHALATION: None given

INGESTION: None given

FIRST AID SOURCE: DOT Emergency Response Guide 1990.

Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen. In case of contact with material, immediately flush eyes with running water for at least 15 minutes. Wash skin with soap and water. Remove and isolate contaminated clothing and shoes at the site.

----- INITIAL INCIDENT RESPONSE -----

DOT SHIPPING NAME: Naphtha, [solvent]
DOT ID NUMBER: UN1256

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GUIDE 27

POTENTIAL HAZARDS

*FIRE OR EXPLOSION

Flammable/combustible material; may be ignited by heat, sparks or flames. Vapors may travel to a source of ignition and flash back. Container may explode in heat of fire. Vapor explosion hazard indoors, outdoors or in sewers. Runoff to sewer may create fire or explosion hazard. Material may be transported hot.

*HEALTH HAZARDS

May be poisonous if inhaled or absorbed through skin. Vapors may cause dizziness or suffocation. Contact may irritate or burn skin and eyes. Fire may produce irritating or poisonous gases. Runoff from fire control or dilution water may cause pollution.

EMERGENCY ACTION

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection. *Isolate for 1/2 mile in all directions if tank, rail car or tank truck is involved in fire. CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, CALL CHEMTREC AT 800-424-9300. If water pollution occurs, notify the appropriate authorities.

*FIRE

Small Fires: Dry chemical, CO₂, water spray or regular foam.
Large Fires: Water spray, fog or regular foam.
Move container from fire area if you can do it without risk. Apply cooling water to sides of containers that are exposed to flames until well after fire is out. Stay away from ends of tanks. For massive fire in cargo area, use unmanned hose holder or monitor nozzles; if this is impossible, withdraw from area and let fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire.

*SPILL OR LEAK

Shut off ignition sources; no flares, smoking or flames in hazard area. Stop leak if you can do it without risk. Water spray may reduce vapor; but it may not prevent ignition in closed spaces.

Small Spills: Take up with sand or other noncombustible absorbent material and place into containers for later disposal.

Large Spills: Dike far ahead of liquid spill for later disposal.

*FIRST AID

Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen. In case of contact with material, immediately flush eyes with running water for at least 15 minutes. Wash skin with soap and water. Remove and isolate contaminated clothing and shoes at the site.

DISCLAIMER: The data shown above on this chemical represents a best effort on the part of the compilers of the CHEMTOX database to obtain useful, accurate, and factual data. The use of these data shall be in accordance with the guidelines and limitations of the user's CHEMTOX license agreement. The COMPILERS of the CHEMTOX database shall not be held liable for inaccuracies or omissions within this database, or in any of its printed or displayed output forms.

Packing group: III
Label(s) required: CORROSIVE
Special provisions: A7, N34, T7
Packaging exceptions: 173.154
Non bulk packaging: 173.203
Bulk packaging: 173.241
Quantity limitations-
Passenger air/rail: 5 L
Cargo aircraft only: 60 L
Vessel stowage: A
Other stowage provisions:

STCC NUMBER: Not listed

CLEAN WATER ACT Sect.307:No
CLEAN WATER ACT Sect.311:Yes
CLEAN AIR ACT: Not listed
EPA WASTE NUMBER: D002
CERCLA REF: Not listed
RQ DESIGNATION: D 5000 pounds (2270 kg) CERCLA
SARA TPQ VALUE: Not listed
SARA Sect. 312
categories:

Acute toxicity: corrosive
Acute toxicity: Irritant

LISTED IN SARA Sect 313: Yes
de minimus CONCENTRATION: 1.0 percent

UNITED STATES POSTAL SERVICE MAILABILITY:
Hazard class: Corrosive material - Mailable as ORM-D
Mailability: Domestic service and air transportation shipper's declaration
Max per parcel: 1 PT 15% SOLUTION

NFPA CODES:
HEALTH HAZARD (BLUE): (2) Hazardous to health. Area may be entered with
self-contained breathing apparatus.
FLAMMABILITY (RED) : (0) This material does not readily burn.
REACTIVITY (YELLOW): (0) Stable even under fire conditions.
SPECIAL : Unspecified

----- SUMMARY OF REGULATORY LISTS THIS SUBSTANCE APPEARS ON -----

ACGIH TLV list "Threshold Limit Values for 1992-1993"
California Assembly Bill 2588 Air Toxics "Hot Spots" Chemicals.
Canadian Domestic Substances List
Canadian Ingredient Disclosure List. 20/01/88 Canada Gazette part II, Vol 122.
Clean Water Act Section 311 Hazardous Chemicals List.
DOT Hazardous Materials Table. 49 CFR 172.101
EPA TSCA Chemical Inventory List 1986
EPA TSCA Chemical Inventory List 1989
EPA TSCA Chemical Inventory List 1990

EPA TSCA Chemical Inventory List 1992
EPA TSCA Test Submission (TSCATS) Database - April 1990
EPA TSCA Test Submission (TSCATS) Database - September 1989
Massachusetts Substance List.
New Jersey Right To Know Substance List. (December 1987)
OSHA Air Contaminant (Table Z-1-A). 54 FR 4332, Jan. 19, 1989 and revised.
PHOSPHORIC ACID [7664-38-2]
RCRA Hazardous Waste
SARA Section 313 Toxic Chemicals List
Superfund/CERCLA RQ list. Table 302.4 in 54 FR 50968 (December 11, 1989)
Wisconsin Air Toxics Control Regulation NR-445 (December 1988)

----- TOXICITY DATA -----

SHORT TERM TOXICITY: INHALATION: 1-5 mg/m³ may cause irritation of nose and throat. 4-11 mg/m³ may cause coughing. inhalation of acid mist can cause lung irritation. SKIN: may cause irritation and burns. solid is especially irritating to skin in the presence of moisture. Eyes: may cause irritation and burns. INGESTION: may cause pain in the throat and stomach, nausea, vomiting and intense thirst. severe exposures may result in shock with clammy skin, weak and rapid pulse, shallow breathing, reduced urine output and death. (NYDH)

LONG TERM TOXICITY: repeated or prolonged skin exposure may cause irritation. (NYDH)

TARGET ORGANS: resp sys, lungs eyes, skin

SYMPTOMS: IRRIT UPPER RESP TRACT, EYES, SKIN; BURNS SKIN; DERMATITIS, CONJUNCTIVITIS, IRRITATION TO TRACHEA, NAUSEA AND VOMITING BY SWALLOWING, STOMACH ACHE, DIARRHEA, ACID INTOXICATION, SHOCK. Source: CHRIS, THIC

CONC IDLH: 10000mg/M³

NIOSH REL:

ACGIH TLV: TLV = 1mg/M³
ACGIH STEL: STEL = 3 mg/M³

OSHA PEL: Transitional Limits:
PEL = 1mg/M³
Final Rule Limits:
TWA = 1 mg/M³
STEL = 3 mg/M³

MAK INFORMATION: Not listed

CARCINOGEN?: N STATUS: See below

CARCINOGEN LISTS:

IARC: Not listed
MAK: Not listed
NIOSH: Not listed
NTP: Not listed
ACGIH: Not listed
OSHA: Not listed

HUMAN TOXICITY DATA: (Source: NIOSH RTECS)

* unr-man LDLo:220 mg/kg 85DCAI 2,73,70

LD50 value: orl-rat LD50:1530 mg/ kg

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1992)

orl-rat LD50:1530 mg/kg
skn-rbt LD50:2740 mg/kg

IRRITATION DATA: (Source: NIOSH RTECS 1992)

Reproductive toxicity (1992 RTECS):

This chemical has no known mammalian reproductive toxicity.

REPRODUCTIVE TOXICITY DATA (1992 RTECS)

California Prop 65: Not listed

----- PROTECTION AND FIRST AID -----

PROTECTION SUGGESTED
FROM THE CHRIS MANUAL:

NIOSH POCKET GUIDE TO CHEMICAL HAZARDS:

** WEAR APPROPRIATE EQUIPMENT TO PREVENT:

** WEAR EYE PROTECTION TO PREVENT:
Any possibility of eye contact.

** EXPOSED PERSONNEL SHOULD WASH:
Immediately when skin becomes contaminated.

** WORK CLOTHING SHOULD BE CHANGED DAILY:
If there is any reasonable possibility that the clothing may be contaminate

** REMOVE CLOTHING:
Immediately remove non-impervious clothing that becomes contaminated.

** REFERENCE: NIOSH

RECOMMENDED RESPIRATION PROTECTION Source: NIOSH POCKET GUIDE (85-114)
HA (PHOSPHORIC ACID)

25 mg/M3: Any supplied-air respirator operated in a continuous flow mode. * Substance reported to cause eye irritation or damage may require eye protection.

50 mg/M3: Any supplied-air respirator with a full facepiece. / Any self-contained breathing apparatus with a full facepiece. / Any air-purifying full facepiece respirator with a high-efficiency particulate filter.

2000 mg/M3: Any supplied-air respirator with a full facepiece and operated in a pressure-demand or other positive pressure mode.

EMERGENCY OR PLANNED ENTRY IN UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS.: Any self-contained breathing apparatus with full facepiece and operated in a pressure-demand or other positive pressure mode. / Any supplied-air respirator with a full facepiece and operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.

ESCAPE: Air purifying respirator (gas mask) (front- or back-mounted or chin style canister) with high-efficiency particulate filter. / Any appropriate escape-type self-contained breathing apparatus.

FIRST AID SOURCE: NIOSHP

EYE: irr immed

SKIN: water flush immed

INHALATION: art resp

INGESTION: water, vomit

FIRST AID SOURCE: DOT Emergency Response Guide 1990.

Move victim to fresh air; call emergency medical care. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Remove and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature.

----- INITIAL INCIDENT RESPONSE -----

FIRE EXTINGUISHMENT: TO FIGHT FIRE: USE WATER. USE WATER TO KEEP FIRE-EXPOSED CONTAINERS COOL. WATER SPRAY MAY BE USED TO FLUSH SPILLS AWAY FROM EXPOSURES. Note: CHRIS91

US Department of Transportation Guide to Hazardous Materials Transport Information - Publication DOT 5800.5 (1990).

DOT SHIPPING NAME: Phosphoric acid

DOT ID NUMBER: UN1805

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GUIDE 60

POTENTIAL HAZARDS

*HEALTH HAZARDS

Contact causes burns to skin and eyes.

If inhaled, may be harmful.

Fire may produce irritating or poisonous gases.
Runoff from fire control or dilution water may cause pollution.

*FIRE OR EXPLOSION

Some of these materials may burn, but none of them ignites readily.
Flammable/poisonous gases may accumulate in tanks and hopper cars.
Some of these materials may ignite combustibles (wood, paper, oil, etc.).

EMERGENCY ACTION

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection. CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, CALL CHEMTREC AT 1-800-424-9300. If water pollution occurs, notify the appropriate authorities.

*FIRE

Some of these materials may react violently with water.
Small Fires: Dry chemical, CO₂, water spray or regular foam.
Large Fires: Water spray, fog or regular foam.
Move container from fire area if you can do it without risk.
Apply cooling water to sides of containers that are exposed to flames until well after fire is out. Stay away from ends of tanks.

*SPILL OR LEAK

Do not touch or walk through spilled material; stop leak if you can do it without risk.
Small Spills: Take up with sand or other noncombustible absorbent material and place into containers for later disposal.
Small Dry Spills: With clean shovel place material into clean, dry container and cover loosely; move containers from spill area.
Large Spills: Dike far ahead of liquid spill for later disposal.

*FIRST AID

Move victim to fresh air; call emergency medical care. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Remove and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature.

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DOT shipping name: Kerosene
Packing group: III
Label(s) required: FLAMMABLE LIQUID
Special provisions: B1, T1
Packaging exceptions: 173.150
Non bulk packaging: 173.203
Bulk packaging: 173.242
Quantity limitations-
Passenger air/rail: 60 L
Cargo aircraft only: 220 L
Vessel stowage: A
Other stowage provisions:

STCC NUMBER: 4915171

CLEAN WATER ACT Sect.307:No
CLEAN WATER ACT Sect.311:No
CLEAN AIR ACT: Not listed
EPA WASTE NUMBER: D001
CERCLA REF: Not listed
RQ DESIGNATION: Not listed
SARA TPQ VALUE: Not listed
SARA Sect. 312
categories:

Acute toxicity: Irritant
Chronic toxicity: mutagen.
Fire hazard: flammable.
Chronic toxicity: carcinogen

UNITED STATES POSTAL SERVICE MAILABILITY:

Hazard class: Combustible liquid - Mailable as ORM-D
Mailability: Domestic service and air transportation shipper's declaration
Max per parcel: 1 GAL

NFPA CODES:

HEALTH HAZARD (BLUE): (0) No unusual health hazard.
FLAMMABILITY (RED) : (2) This material must be moderately heated before
ignition will occur.
REACTIVITY (YELLOW): (0) Stable even under fire conditions.
SPECIAL : Unspecified

----- SUMMARY OF REGULATORY LISTS THIS SUBSTANCE APPEARS ON -----

Canadian Domestic Substances List
DOT Hazardous Materials Table. 49 CFR 172.101
EPA TSCA Chemical Inventory List 1989
EPA TSCA Chemical Inventory List 1990
EPA TSCA Chemical Inventory List 1992
EPA TSCA Test Submission (TSCATS) Database - April 1990
EPA TSCA Test Submission (TSCATS) Database - September 1989
KEROSENE [8008-20-6]

Massachusetts Substance List.

New Jersey Right To Know Substance List. (December 1987)

OSHA Process Safety Rule chemical with a TQ. Effective May 26, 1992

Pennsylvania Hazardous Substance List

RCRA Hazardous Waste

----- TOXICITY DATA -----

SHORT TERM TOXICITY: INHALATION: does not evaporate fast enough to cause health effects except when heated or in enclosed spaces. headache, tiredness, stupor, dizziness, nausea, coma and death, may occur with increasing exposure. SKIN: if not promptly removed, may cause reddening, blisters, itching and an increased risk of infection. Eyes: irritation may occur. INGESTION: accidental ingestion of unknown amounts has caused irritation of mouth, throat and stomach, nausea, vomiting, rapid breathing, blue skin coloration, and convulsions. death may result from as little as 1 fluid ounce. inhalation into lungs following ingestion may result in bronchitis, chemical pneumonia, accumulation of fluid and blood in lungs, and death. as little as 1/30 oz. may be fatal in this way. (NYDH)

LONG TERM TOXICITY: absorption through skin is slow but repeated skin contact over many years has caused muscular weakness, anemia, changes in white blood cells, fever and death. (NYDH)

TARGET ORGANS:

SYMPTOMS: Vapor causes slight irritation of eyes and nose. Liquid irritates stomach; if taken into lungs, causes coughing, distress, and rapidly developing pulmonary edema. Source: CHRIS

CONC IDLH: Nonegiven

NIOSH REL: 100 mg/M3 Time weighted averages for 8-hour exposure

ACGIH TLV: Not listed

ACGIH STEL: Not listed

OSHA PEL: Not in Table Z-1-A

MAK INFORMATION: Not listed

CARCINOGEN?: Y STATUS: See below

CARCINOGEN LISTS:

IARC: Carcinogen defined by IARC
to be probably carcinogenic to
humans with (usually) at least
limited human evidence.

MAK: Not listed
NIOSH: Not listed
NTP: Not listed
ACGIH: Not listed
OSHA: Not listed

LD50 value: orl-rat LD50:26 gm/ kg

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1992)

orl-rat LD50:26 gm/kg

IRRITATION DATA: (Source: NIOSH RTECS 1992)

Reproductive toxicity (1992 RTECS):

This chemical has no known mammalian reproductive toxicity.

REPRODUCTIVE TOXICITY DATA (1992 RTECS)

California Prop 65: Not listed

----- PROTECTION AND FIRST AID -----

PROTECTION SUGGESTED
FROM THE CHRIS MANUAL:
protective gloves; goggles or face shield.

FIRST AID SOURCE: CHRIS Manual 1991
ASPIRATION: enforce bed rest; administer oxygen; call a doctor.
INGESTION: do NOT induce vomiting; call a doctor.
EYES: wash with plenty of water.
SKIN: wipe off and wash with soap and water.

FIRST AID SOURCE: DOT Emergency Response Guide 1990.
Move victim to fresh air and call emergency medical care; if not
breathing, give artificial respiration; if breathing is difficult, give
oxygen. In case of contact with material, immediately flush eyes with
running water for at least 15 minutes. Wash skin with soap and water.
Remove and isolate contaminated clothing and shoes at the site.

----- INITIAL INCIDENT RESPONSE -----

FIRE EXTINGUISHMENT: Foam, dry chemical, or carbon dioxide. Note: Water
may be ineffective CHRIS91

US Department of Transportation Guide to Hazardous Materials Transport Information - Publication DOT 5800.5 (1990).

NET SHIPPING NAME: Kerosene
ID NUMBER: UN1223

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GUIDE 27

POTENTIAL HAZARDS

***FIRE OR EXPLOSION**

Flammable/combustible material; may be ignited by heat, sparks or flames. Vapors may travel to a source of ignition and flash back. Container may explode in heat of fire. Vapor explosion hazard indoors, outdoors or in sewers. Runoff to sewer may create fire or explosion hazard. Material may be transported hot.

***HEALTH HAZARDS**

May be poisonous if inhaled or absorbed through skin. Vapors may cause dizziness or suffocation. Contact may irritate or burn skin and eyes. Fire may produce irritating or poisonous gases. Runoff from fire control or dilution water may cause pollution.

EMERGENCY ACTION

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection. *Isolate for 1/2 mile in all directions if tank, rail car or tank truck is involved in fire. CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, CALL CHEMTREC AT 800-424-9300. If water pollution occurs, notify the appropriate authorities.

***FIRE**

Small Fires: Dry chemical, CO₂, water spray or regular foam.
Large Fires: Water spray, fog or regular foam.
Move container from fire area if you can do it without risk. Apply cooling water to sides of containers that are exposed to flames until well after fire is out. Stay away from ends of tanks. For massive fire in cargo area, use unmanned hose holder or monitor nozzles; if this is impossible, withdraw from area and let fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire.

***SPILL OR LEAK**

Shut off ignition sources; no flares, smoking or flames in hazard area. Stop leak if you can do it without risk. Water spray may reduce vapor; but it may not prevent ignition in closed spaces.
Small Spills: Take up with sand or other noncombustible absorbent material and place into containers for later disposal.
Large Spills: Dike far ahead of liquid spill for later disposal.

***FIRST AID**

Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen. In case of contact with material, immediately flush eyes with running water for at least 15 minutes. Wash skin with soap and water. Remove and isolate contaminated clothing and shoes at the site.

CLAIMER: The data shown above on this chemical represents a best effort on the part of the compilers of the CHEMTOX database to obtain useful, accurate, and factual data. The use of these data shall be in accordance with the guidelines and limitations of the user's CHEMTOX license agreement. The COMPILERS of the CHEMTOX database shall not be held liable for inaccuracies or omissions within this database, or in any of its printed or displayed output forms.

CHEMTOX DATA

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----- IDENTIFIERS -----

CHEMTOX RECORD 2096 LAST UPDATE OF THIS RECORD: 06/03/93
NAME: SULFURIC ACID, WITH MORE THAN 51% BUT NOT MORE THAN 95% ACID
SYNONYMS:
CAS: 7664-93-9 RTECS:
FORMULA: H2O4S MOL WT:
WLN: H2 S-O4
CHEMICAL CLASS: Non-oxidizing min. acid

See other identifiers listed below under Regulations.

----- PROPERTIES -----

PHYSICAL DESCRIPTION:

BOILING POINT: NA
MELTING POINT: NA
FLASH POINT: Not available
AUTO IGNITION: Not available
VAPOR PRESSURE:
UEL: Not applicable
LEL: Not applicable
IONIZATION POTENTIAL (eV): 12.54
VAPOR DENSITY: No data
SPECIFIC GRAVITY: No data
DENSITY:
WATER SOLUBILITY:
INCOMPATIBILITIES:

REACTIVITY WITH WATER: No data on water reactivity
REACTIVITY WITH COMMON MATERIALS: No data
STABILITY DURING TRANSPORT: No Data
NEUTRALIZING AGENTS: No data
POLYMERIZATION POSSIBILITIES: No data

TOXIC FIRE GASES: None reported other than possible unburned vapors
ODOR DETECTED AT (ppm): Unknown
ODOR DESCRIPTION: No data
100 % ODOR DETECTION: No data

----- REGULATIONS -----

DOT hazard class: 8 CORROSIVE
DOT guide: 39
Identification number: UN1830
DOT shipping name: SULFURIC ACID
Packing group: II
Label(s) required: CORROSIVE

Special provisions: A3,A7,B3,B83,B84,N34,T9,T27
Packaging exceptions: 173.154
Non bulk packaging: 173.202
Bulk packaging: 173.242
Quantity limitations-
Passenger air/rail: 1 L
Cargo aircraft only: 30 L
Vessel stowage: C
Other stowage provisions:14

STCC NUMBER: Not listed

CLEAN WATER ACT Sect.307:No

CLEAN WATER ACT Sect.311:No

CLEAN AIR ACT: Not listed

EPA WASTE NUMBER: D002

CERCLA REF: Not listed

RQ DESIGNATION: C 1000 pounds (454 kg) CERCLA

SARA TPQ VALUE: 1000 pounds

SARA Sect. 312

categories:

Acute toxicity: corrosive

Acute toxicity: Irritant

Chronic toxicity: mutagen.

Chronic toxicity: reproductive toxin.

LISTED IN SARA Sect 313: Yes

de minimus CONCENTRATION: 1.0 percent

UNITED STATES POSTAL SERVICE MAILABILITY:
Not given

NFPA CODES:

HEALTH HAZARD (BLUE): Unspecified

FLAMMABILITY (RED) : Unspecified

REACTIVITY (YELLOW): Unspecified

SPECIAL : Unspecified

----- SUMMARY OF REGULATORY LISTS THIS SUBSTANCE APPEARS ON -----

Canadian Domestic Substances List

Canadian Ingredient Disclosure List. 20/01/88 Canada Gazette part II, Vol 122.

EPA TSCA Chemical Inventory List 1989

EPA TSCA Chemical Inventory List 1990

EPA TSCA Chemical Inventory List 1992

EPA TSCA Test Submission (TSCATS) Database - April 1990

EPA TSCA Test Submission (TSCATS) Database - September 1989

Massachusetts Substance List.

Pennsylvania Hazardous Substance List

RCRA Hazardous Waste

SARA Section 313 Toxic Chemicals List

SARA Title III Extremely Hazardous Substance. Sections 302 and 304.

SULFURIC ACID, WITH MORE THAN 51% BUT NOT MORE THAN 95% ACID [7664-93-9]

Superfund/CERCLA RQ list. Table 302.4 in 54 FR 50968 (December 11, 1989)

Wisconsin Air Toxics Control Regulation NR-445 (December 1988)

----- TOXICITY DATA -----

SHORT TERM TOXICITY: Unknown

LONG TERM TOXICITY: unknown

TARGET ORGANS:

SYMPTOMS: Source:

CONC IDLH: Nonegiven

NIOSH REL: 1 mg/M3 Time weighted averages for 8-hour exposure

ACGIH TLV: Not listed

ACGIH STEL: Not listed

OSHA PEL: Not in Table Z-1-A

MAK INFORMATION: 1.5 calculated as total dust mg/M3

CARCINOGEN?: N STATUS: See below

CARCINOGEN LISTS:

IARC: Not listed
MAK: Not listed
NIOSH: Not listed
NTP: Not listed
ACGIH: Not listed
OSHA: Not listed

HUMAN TOXICITY DATA: (Source: NIOSH RTECS)

ihl-hmn TCLO:3 mg/m3/24W BJIMAG 18,63,61

MUSCULOSKELETAL

Changes in teeth and supporting structures

LD50 value: orl-rat LD50:2140 mg/ kg

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1992)

orl-rat LD50:2140 mg/kg
ihl-rat LC50:510 mg/m3/2H
ihl-mus LC50:320 mg/m3/2H
ihl-gpg LC50:18 mg/m3

IRRITATION DATA: (Source: NIOSH RTECS 1992)

Reproductive toxicity (1992 RTECS):

This chemical is a mammalian reproductive toxin.

REPRODUCTIVE TOXICITY DATA (1992 RTECS)

ihl-rbt TCLO:20 mg/m³/7H (6-18D preg) JEHS DH 13,251,79
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

California Prop 65: Not listed

----- PROTECTION AND FIRST AID -----

PROTECTION SUGGESTED
FROM THE CHRIS MANUAL:

FIRST AID SOURCE: DOT Emergency Response Guide 1990.
Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Speed in removing material from skin is of extreme importance. Removal of solidified molten material from skin requires medical assistance. Remove and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature.

----- INITIAL INCIDENT RESPONSE -----

US Department of Transportation Guide to Hazardous Materials Transport Information - Publication DOT 5800.5 (1990).
DOT SHIPPING NAME: SULFURIC ACID
DOT ID NUMBER: UN1830

ERG93 GUIDE 39

POTENTIAL HAZARDS

*HEALTH HAZARDS

Poisonous if inhaled or swallowed.
Contact causes severe burns to skin and eyes.
Runoff from fire control or dilution water may cause pollution.

*FIRE OR EXPLOSION

Some of these materials may burn, but none of them ignites readily.
May ignite other combustible materials (wood, paper, oil, etc.).
Violent reaction with water.
Flammable/poisonous gases may accumulate in tanks and hopper cars.
Runoff to sewer may create fire or explosion hazard.
Material may be transported in a molten form.

EMERGENCY ACTION

Keep unnecessary people away; isolate hazard area and deny entry. Stay

upwind, out of low areas, and ventilate closed spaces before entering. Positive pressure self-contained breathing apparatus (SCBA) and chemical protective clothing which is specifically recommended by the supplier or manufacturer may be worn. It may provide little or no thermal protection.

*Structural firefighters' protective clothing is not effective for these materials. Isolate the leak or spill area immediately for at least 150 feet in all directions. See the Table of Initial Isolation and Protective Action Distances. If you find the ID Number and the name of the material there, begin protective action. CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, CALL CHEMTREC AT 1-800-424-9300.

*FIRE

Do not get water inside container.

Small Fires: Dry chemical or CO2.

Large Fires: Flood fire area with water from a distance.

Do not get solid stream of water on spilled material. Move container from fire area if you can do it without risk. Apply cooling water to sides of containers that are exposed to flames until well after fire is out. Stay away from ends of tanks.

*SPILL OR LEAK

Do not touch or walk through spilled material; stop leak if you can do it without risk. Fully-encapsulating, vapor-protective clothing should be worn for spills and leaks with no fire. Use water spray to reduce vapor; do not put water directly on leak, spill area or inside container. Keep combustibles (wood, paper, oil, etc.) away from spilled material.

Spills: Dike for later disposal; do not apply water unless directed to do so. Cleanup only under supervision of an expert.

*FIRST AID

Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Speed in removing material from skin is of extreme importance. Removal of solidified molten material from skin requires medical assistance. Remove and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature.

DISCLAIMER: The data shown above on this chemical represents a best effort on the part of the compilers of the CHEMTOX database to obtain useful, accurate, and factual data. The use of these data shall be in accordance with the guidelines and limitations of the user's CHEMTOX license agreement. The COMPILERS of the CHEMTOX database shall not be held liable for inaccuracies or omissions within this database, or in any of its printed or displayed output forms.

Label(s) required:
Special provisions:
Packaging exceptions: 173.
bulk packaging: 173.
Bulk packaging: 173.
Quantity limitations-
Passenger air/rail:
Cargo aircraft only:
Vessel stowage:
Other stowage provisions:

STCC NUMBER: Not listed

CLEAN WATER ACT Sect.307:No
CLEAN WATER ACT Sect.311:No
CLEAN AIR ACT: Not listed
EPA WASTE NUMBER: None
CERCLA REF: Not listed
RQ DESIGNATION: Not listed
SARA TPQ VALUE: Not listed
SARA Sect. 312
categories:

Acute toxicity: Irritant
Fire hazard: combustible.

UNITED STATES POSTAL SERVICE MAILABILITY:
Not given

NFPA CODES:
HEALTH HAZARD (BLUE): Unspecified
FLAMMABILITY (RED) : Unspecified
REACTIVITY (YELLOW): Unspecified
SPECIAL : Unspecified

----- SUMMARY OF REGULATORY LISTS THIS SUBSTANCE APPEARS ON -----

ACGIH TLV list "Threshold Limit Values for 1992-1993"
Canadian Domestic Substances List
Canadian Ingredient Disclosure List. 20/01/88 Canada Gazette part II, Vol 122.
EPA TSCA Chemical Inventory List 1989
EPA TSCA Chemical Inventory List 1990
EPA TSCA Chemical Inventory List 1992
EPA TSCA Test Submission (TSCATS) Database - April 1990
EPA TSCA Test Submission (TSCATS) Database - September 1989
Massachusetts Substance List.
New Jersey Right To Know Substance List. (December 1987)
OIL MIST, MINERAL [8012-95-1]
OSHA Air Contaminant (Table Z-1-A). 54 FR 4332, Jan. 19, 1989 and revised.

----- TOXICITY DATA -----

SHORT TERM TOXICITY: ASPIRATION PNEUMONIA, CARCINOGEN OF SKIN AND SCROTUM.

** Source: 2

LONG TERM TOXICITY: unknown

TARGET ORGANS:

SYMPTOMS: NONE REPORTED Source: NIOSHP

CONC IDLH: Nonegiven

NIOSH REL:

ACGIH TLV: TLV = 5mg/M3
ACGIH STEL: STEL = 10 mg/M3

OSHA PEL: Transitional Limits:
PEL = 5mg/M3
Final Rule Limits:
TWA = 5 mg/M3

MAK INFORMATION: Not listed

CARCINOGEN?: N STATUS: See below

CARCINOGEN LISTS:
IARC: Not listed
MAK: Not listed
NIOSH: Not listed
NTP: Not listed
ACGIH: Not listed
OSHA: Not listed

LD50 value: orl-rat LD50:>24 gm/ kg

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1992)

orl-rat LD50:>24 gm/kg

IRRITATION DATA: (Source: NIOSH RTECS 1992)

Reproductive toxicity (1992 RTECS):

This chemical has no known mammalian reproductive toxicity.

REPRODUCTIVE TOXICITY DATA (1992 RTECS)

California Prop 65: Not listed

----- PROTECTION AND FIRST AID -----

PROTECTION SUGGESTED
FROM THE CHRIS MANUAL:

NIOSH POCKET GUIDE TO CHEMICAL HAZARDS:

- ** WEAR APPROPRIATE EQUIPMENT TO PREVENT:
Repeated or prolonged skin contact.
- ** EXPOSED PERSONNEL SHOULD WASH:
Promptly when skin becomes wet.
- ** REMOVE CLOTHING:
Promptly remove non-impervious clothing that becomes wet.
- ** REFERENCE: NIOSH

RECOMMENDED RESPIRATION PROTECTION Source: NIOSH POCKET GUIDE (85-114)
OSHA (OIL MIST, MINERAL)

50 mg/M3: Any supplied-air respirator. / Any self-contained breathing apparatus. / Any air-purifying respirator with a high-efficiency particulate filter.

125 mg/M3: Any supplied-air respirator operated in a continuous flow mode. / Any powered air-purifying respirator with a high-efficiency particulate filter.

500 mg/M3: Any air-purifying full facepiece respirator with a high-efficiency particulate filter. / Any powered air-purifying respirator with a tight-fitting facepiece and a high-efficiency particulate filter. / Any supplied-air respirator with a tight-fitting facepiece operated in a continuous flow mode. / Any self-contained breathing apparatus with a full facepiece. / Any supplied-air respirator with a full facepiece.

2500 mg/M3: Any supplied-air respirator with a half-mask and operated in a pressure-demand or other positive pressure mode.

EMERGENCY OR PLANNED ENTRY IN UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS.: Any self-contained breathing apparatus with full facepiece and operated in a pressure-demand or other positive pressure mode. / Any supplied-air respirator with a full facepiece and operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.

ESCAPE: Any air-purifying full facepiece respirator with a high-efficiency particulate filter. / Any appropriate escape-type self-contained breathing apparatus.

FIRST AID SOURCE: NIOSH

EYE: None given

SKIN: soap wash

INHALATION: fresh air

INGESTION: None given

----- INITIAL INCIDENT RESPONSE -----

No DOT Guide information for this compound.

DISCLAIMER: The data shown above on this chemical represents a best effort on the part of the compilers of the CHEMTOX database to obtain useful, accurate, and factual data. The use of these data shall be in accordance with the guidelines and limitations of the user's CHEMTOX license agreement.

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CHEMTOX DATA

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----- IDENTIFIERS -----

CHEMTOX RECORD 421
 NAME: XYLENE
 SYNONYMS: XYLENE (XYLOL); XYLOL; METHYL TOLUENE; BENZENE, DIMETHYL-;
 DIMETHYLBENZENE; NCI-C55232; VIOLET 3; XYLOL (DOT); SOCIAL
 AQUATIC SOLVENT 3501
 CAS: 1330-20-7 RTECS: ZE2100000
 FORMULA: C8H10 MOL WT: 106.18
 WLN: 1R X1
 CHEMICAL CLASS: Aromatic hydrocarbon

LAST UPDATE OF THIS RECORD: 06/03/93

See other identifiers listed below under Regulations.

----- PROPERTIES -----

PHYSICAL DESCRIPTION: colorless liquid with aromatic odor
 BOILING POINT: 412 K 138.8 C 281.9 F
 MELTING POINT: 247 K -26.2 C -15.1 F
 FLASH POINT: 300.35-305.35 K 27.2-32.2 C 80.9-89.9 F
 AUTO IGNITION: 736.45-802.05 K 463.3-528.9 C 866-984.1 F
 VAPOR PRESSURE: 6.7 mm @ 21 C
 UEL: 7 %
 LEL: 1 %
 IONIZATION POTENTIAL (eV): 8.56
 VAPOR DENSITY: 3.7 (air=1)
 EVAPORATION RATE: 0.77 (n-BUTYL ACETATE=1)
 SPECIFIC GRAVITY: 0.861 20C
 DENSITY: 0.861 g/cc or 8.0073 lb/gal
 WATER SOLUBILITY: VERY SL SOL
 INCOMPATIBILITIES: strong oxidizers

REACTIVITY WITH WATER: No data on water reactivity
 REACTIVITY WITH COMMON MATERIALS: No data
 STABILITY DURING TRANSPORT: No Data
 NEUTRALIZING AGENTS: No data
 POLYMERIZATION POSSIBILITIES: No data

TOXIC FIRE GASES: None reported other than possible
 unburned vapors

ODOR DETECTED AT (ppm): 0.05
 ODOR DESCRIPTION: LIKE BENZENE; CHARACTERISTIC AROMATIC
 Source: CHRIS
 100 % ODOR DETECTION: 0.4-20 ppm

----- REGULATIONS -----

DOT hazard class: 3 FLAMMABLE LIQUID
 DOT guide: 27

Identification number: UN1307
DOT shipping name: XYLENES
Packing group: II
Label(s) required: FLAMMABLE LIQUID
Special provisions: T1
Packaging exceptions: 173.150
Non bulk packaging: 173.202
Bulk packaging: 173.242
Quantity limitations-
Passenger air/rail: 5 L
Cargo aircraft only: 60 L
Vessel stowage: B
Other stowage provisions:

STCC NUMBER: 4909350, 4909351

CLEAN WATER ACT Sect.307:No
CLEAN WATER ACT Sect.311:Yes
National Primary Drinking Water Regulations
Maximum Contaminant Levels (MCL): 10 mg/L (07/30/92)
Maximum Contaminant Level Goals (MCLG): 10 mg/L (07/30/92)
CLEAN AIR ACT: CAA '90 Listed
EPA WASTE NUMBER: U239,D001
CERCLA REF: Not listed
RQ DESIGNATION: C 1000 pounds (454 kg) CERCLA
SARA TPQ VALUE: Not listed
SARA Sect. 312
categories:

Acute toxicity: Irritant
Acute toxicity: adverse effect to target organs.
Chronic toxicity: adverse effect to target organ
after long period of exposure.
Chronic toxicity: reproductive toxin.
Fire hazard: flammable.
Chronic toxicity: carcinogen

LISTED IN SARA Sect 313: Yes
de minimus CONCENTRATION: 1.0 percent

UNITED STATES POSTAL SERVICE MAILABILITY:

Hazard class: Not given
Mailability: Nonmailable
Max per parcel: 0

NFPA CODES:

HEALTH HAZARD (BLUE): (2) Hazardous to health. Area may be entered with
self-contained breathing apparatus.
FLAMMABILITY (RED) : (3) This material can be ignited under almost all
temperature conditions.
REACTIVITY (YELLOW): (0) Stable even under fire conditions.
SPECIAL : Unspecified

----- SUMMARY OF REGULATORY LISTS THIS SUBSTANCE APPEARS ON -----

ACGIH TLV list "Threshold Limit Values for 1992-1993"
California Assembly Bill 1803 Well Monitoring Chemicals.
Canadian Domestic Substances List
Clean Air Act Section 111 List.
Clean Air Act of November 15, 1990. List of pollutants.
Clean Water Act Section 311 Hazardous Chemicals List.
DOT Hazardous Materials Table. 49 CFR 172.101
EPA List of VOC chemicals from 40 CFR 60.489
EPA TSCA Chemical Inventory List 1986
EPA TSCA Chemical Inventory List 1989
EPA TSCA Chemical Inventory List 1990
EPA TSCA Chemical Inventory List 1992
EPA TSCA Test Submission (TSCATS) Database - April 1990
EPA TSCA Test Submission (TSCATS) Database - September 1989
Massachusetts Substance List.
New Jersey DEQ100 list for release reporting.
New Jersey Right To Know Substance List. (December 1987)
OSHA Air Contaminant (Table Z-1-A). 54 FR 4332, Jan. 19, 1989 and revised.
OSHA Process Safety Rule chemical with a TQ. Effective May 26, 1992
Pennsylvania Hazardous Substance List
RCRA Hazardous Constituents for Ground Water Monitoring. Ap'dx IX to 40 CFR 264
RCRA Hazardous Waste
SARA Section 110 Priority List of CERCLA Hazardous Substances
SARA Section 313 Toxic Chemicals List
Superfund/CERCLA RQ list. Table 302.4 in 54 FR 50968 (December 11, 1989)
Washington State Discarded Chemical Products List, November 17, 1989
Wisconsin Air Toxics Control Regulation NR-445 (December 1988)
XYLENE [1330-20-7]

----- TOXICITY DATA -----

SHORT TERM TOXICITY: Unknown

LONG TERM TOXICITY: unknown

TARGET ORGANS: CNS, eyes, gi tract, blood, liver, kidneys, skin

SYMPTOMS: DIZZ, EXCITEMENT, DROW, INCO, STAGGERING GAIT, IRRIT
EYES, NOSE, THROAT, CORNEAL VACUOLIZATION, ANOREXIA,
NAU, VOMIT, ABDOM PAIN; DERM Source: CHRIS

CONC IDLH: 1000ppm

NIOSH REL: 100 ppm Time weighted averages for 8-hour exposure
434 mg/M3 Time weighted averages for 8-hour exposure
200 ppm Ceiling exposures which shall at no time be
exceeded(10-MIN) 868 mg/M3 Ceiling exposures which
shall at no time be exceeded(10-MIN)

ACGIH TLV: TLV = 100ppm(434 mg/M3)

ACGIH STEL: STEL = 150 ppm(651 mg/M3)

OSHA PEL: Transitional Limits:
PEL = 100 ppm(435mg/M3)
Final Rule Limits:
TWA = 100 ppm (435 mg/M3)
STEL = 150 ppm(655 mg/M3)

MAK INFORMATION: 100 ppm
440 mG/M3
Substance with systemic effects, onset of effect less than or equal to 2 hrs: Peak = 2xMAK for 30 minutes, 4 times per shift of 8 hours.

CARCINOGEN?: N STATUS: See below

CARCINOGEN LISTS:
IARC: Not classified as to human carcinogenicity or probably not carcinogenic to humans.
MAK: Not listed
NIOSH: Not listed
NTP: Not listed
ACGIH: Not listed
OSHA: Not listed

HUMAN TOXICITY DATA: (Source: NIOSH RTECS)
* orl-hmn LDLo:50 mg/kg YAKUD5 22,883,80
ihl-man LCLo:10000 ppm/6H BMJOAE 3,442,70
BEHAVIORAL
General anesthetic
LUNGS, THORAX, OR RESPIRATION
Cyanosis
BLOOD
Other changes

LD50 value: orl-rat LD50:4300 mg/ kg

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1992)
orl-rat LD50:4300 mg/kg
ihl-rat LC50:5000 ppm/4H
ipr-rat LD50:2459 mg/kg
scu-rat LD50:1700 mg/kg
ipr-mus LD50:1548 mg/kg
ivn-rbt LDLo:129 mg/kg
ihl-gpg LCLo:450 ppm
ipr-gpg LDLo:2 gm/kg
ipr-mam LDLo:2 gm/kg

IRRITATION DATA: (Source: NIOSH RTECS 1992)

Reproductive toxicity (1992 RTECS):

This chemical is a mammalian reproductive toxin.

REPRODUCTIVE TOXICITY DATA (1992 RTECS)

ihl-rat TClO:250 mg/m³/24H (7-15D preg) ATSUDG 8,425,85
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

ihl-rat TClO:50 mg/m³/6H (1-21D preg) JHEMA2 27,337,83
EFFECTS ON FERTILITY
Post-implantation mortality
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Craniofacial(including nose and tongue)

ihl-rat TClO:50 mg/m³/6H (1-21D preg) JHEMA2 27,337,83
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Other developmental abnormalities
EFFECTS ON NEWBORN
Growth statistics(e.g.,reduced weight gain)

ihl-rat TClO:600 mg/m³/24H (7-15D preg) PCBRD2
163B,295,85
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

orl-mus TDLo:20600 ug/kg (6-15D preg) JTEHD6 9,97,82
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Craniofacial(including nose and tongue)
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

orl-mus TDLo:31 mg/kg (6-15D preg) JTEHD6 9,97,82
EFFECTS ON FERTILITY
Post-implantation mortality

ihl-mus TClO:4000 ppm/6H (6-12D preg) TJADAB 28,22A,83
EFFECTS ON NEWBORN
Growth statistics(e.g.,reduced weight gain)
EFFECTS ON NEWBORN
Physical

ihl-mus TClO:2000 ppm/6H (6-12D preg) TJADAB 28,22A,83
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)

ihl-mus TClO:1 gm/m3/12H (6-15D preg) ATSUDG 8,425,85
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

ihl-rbt TClO:500 mg/m3/24H (7-20D preg) ATSUDG 8,425,85
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)

California Prop 65: Not listed

----- EPA's IRIS DATA SUMMARY -----
Xylenes; CASRN 1330-20-7 (04/01/92)

II. CARCINOGENICITY ASSESSMENT FOR LIFETIME EXPOSURE

Substance Name -- Xylenes
CASRN -- 1330-20-7
Last Revised -- 03/01/91

Section II provides information on three aspects of the carcinogenic risk assessment for the agent in question; the U.S. EPA classification, and quantitative estimates of risk from oral exposure and from inhalation exposure. The classification reflects a weight-of-evidence judgment of the likelihood that the agent is a human carcinogen. The quantitative risk estimates are presented in three ways. The slope factor is the result of application of a low-dose extrapolation procedure and is presented as the risk per (mg/kg)/day. The unit risk is the quantitative estimate in terms of either risk per ug/L drinking water or risk per ug/cu.m air breathed. The third form in which risk is presented is a drinking water or air concentration providing cancer risks of 1 in 10,000, 1 in 100,000 or 1 in 1,000,000. Background Document 2 (Service Code 5) provides details on the rationale and methods used to derive the carcinogenicity values found in IRIS. Users are referred to Section I for information on long-term toxic effects other than carcinogenicity.

II.A. EVIDENCE FOR CLASSIFICATION AS TO HUMAN CARCINOGENICITY

II.A.1. WEIGHT-OF-EVIDENCE CLASSIFICATION

Classification -- D; not classifiable as to human carcinogenicity.

Basis -- Orally administered technical xylene mixtures did not result in significant increases in incidences in tumor responses in rats or mice of both sexes.

II.A.2. HUMAN CARCINOGENICITY DATA

None.

II.A.3. ANIMAL CARCINOGENICITY DATA

Inadequate. In an NTP (1986) study, 50 male and 50 female F344/N rats were treated by gavage with mixed xylenes in corn oil (60% m-xylene, 14% p-xylene, 9% o-xylene and 17% ethylbenzene) at dosages of 0, 250 or 500 mg/kg/day, 5 days/week for 103 weeks. Similarly, 50 male and 50 female B6C3F1 mice were treated with the same xylene mixture at dosages of 0, 500 or 1000 mg/kg/day. Animals were killed and examined histologically when moribund or after 104-105 weeks. An apparent dose-related increased mortality was observed in male rats, but this difference was statistically significant for the high dose group, only. No other differences in survival between dosage groups of either sex were observed. Interstitial cell tumors of the testes could not be attributed to administration of the test compound observed in male rats (43/50 control, 38/50 low-dose and 41/49 high-dose). NTP (1986) reported that there were no significant changes in the incidence of neoplastic or nonneoplastic lesions in either the rats or mice that could be considered related to the mixed xylene treatment, and concluded that under the conditions of these 2-year gavage studies, there was "no evidence of carcinogenicity" of xylene (mixed) for rats or mice of either sex at any dosage tested.

Maltoni et al. (1985), in a limited study, reported higher incidences (compared with controls) of malignant tumors in male and female Sprague-Dawley rats treated by gavage with xylene in olive oil at 500 mg/kg/day, 4 or 5 days/week for 104 weeks. This study did not report survival rates or specific tumor types; therefore, the results cannot be interpreted.

Berenblum (1941) reported that "undiluted" xylene applied at weekly intervals produced one tumor-bearing animal out of 40 after 25 weeks in skin-painting experiments in mice. No control groups were described. Pound (1970) reported negative results in initiation-promotion experiments with xylene as the initiator and croton oil as the promotor.

II.A.4. SUPPORTING DATA FOR CARCINOGENICITY

The frequency of sister chromatid exchanges and chromosomal aberrations were nearly identical between a group of 17 paint industry workers exposed to xylene and their respective referents (Haglund et al., 1980). In vitro, xylene caused no increase in the number of sister chromatid exchanges in human lymphocytes (Gerner-Smidt and Friedrich, 1978). Studies indicate that xylene isomers, technical grade xylene or mixed xylene are not mutagenic in tests with *Salmonella typhimurium* (Florin et al., 1980; NTP, 1986; Bos et al., 1981) nor in mutant reversion assays with *Escherichia coli* (McCarroll et al., 1981). Technical grade xylene, but not o- and m-xylene, was weakly mutagenic in *Drosophila* recessive lethal tests. Chromosomal aberrations were not increased in bone marrow cells of rats exposed to xylenes by inhalation (Donner et al., 1980).

__ II.B. QUANTITATIVE ESTIMATE OF CARCINOGENIC RISK FROM ORAL EXPOSURE

Not available.

__ II.C. QUANTITATIVE ESTIMATE OF CARCINOGENIC RISK FROM INHALATION EXPOSURE

Not available.

__ II.D. EPA DOCUMENTATION, REVIEW, AND CONTACTS (CARCINOGENICITY ASSESSMENT)

__ II.D.1. EPA DOCUMENTATION

U.S. EPA. 1987. Drinking Water Criteria Document for Xylene. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH for the Office of Drinking Water, Washington, DC. ECAO-CIN-416. Final.

__ II.D.2. REVIEW (CARCINOGENICITY ASSESSMENT)

The Drinking Water Criteria Document for Xylene has received Agency and external review.

Agency Work Group Review: 12/02/87

Verification Date: 12/02/87

__ II.D.3. U.S. EPA CONTACTS (CARCINOGENICITY ASSESSMENT)

Bruce Mintz / ODW -- (202)260-9569 / FTS 260-9569

W. Bruce Peirano / ORD -- (513)569-7540 / FTS 684-7540

----- PROTECTION AND FIRST AID -----

PROTECTION SUGGESTED
FROM THE CHRIS MANUAL:

NIOSH POCKET GUIDE TO CHEMICAL HAZARDS:

- ** WEAR APPROPRIATE EQUIPMENT TO PREVENT:
Repeated or prolonged skin contact.
- ** WEAR EYE PROTECTION TO PREVENT:
Reasonable probability of eye contact.
- ** EXPOSED PERSONNEL SHOULD WASH:
Promptly when skin becomes contaminated.
- ** REMOVE CLOTHING:
Immediately remove any clothing that becomes wet to avoid any flammability
- ** REFERENCE: NIOSH

RECOMMENDED RESPIRATION PROTECTION Source: NIOSH POCKET GUIDE (85-114)
NIOSH (XYLENE)

1000 ppm: Any chemical cartridge respirator with organic vapor cartridge(s). * Substance reported to cause eye irritation or damage may require eye protection. / Any powered air-purifying respirator with organic vapor cartridge(s). * Substance reported to cause eye irritation or damage may require eye protection. / Any supplied-air respirator. * Substance reported to cause eye irritation or damage may require eye protection. / Any self-contained breathing apparatus. * Substance reported to cause eye irritation or damage may require eye protection.
EMERGENCY OR PLANNED ENTRY IN UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS.: Any self-contained breathing apparatus with full facepiece and operated in a pressure-demand or other positive pressure mode. / Any supplied-air respirator with a full facepiece and operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.

ESCAPE: Any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister. / Any appropriate escape-type self-contained breathing apparatus.

FIRST AID SOURCE: NIOSH
EYE: irr immed
SKIN: soap wash promptly
INHALATION: art resp
INGESTION: no vomit

FIRST AID SOURCE: DOT Emergency Response Guide 1990.
Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen. In case of contact with material, immediately flush eyes with

running water for at least 15 minutes. Wash skin with soap and water. Remove and isolate contaminated clothing and shoes at the site.

----- INITIAL INCIDENT RESPONSE -----

US Department of Transportation Guide to Hazardous Materials Transport Information - Publication DOT 5800.5 (1990).

DOT SHIPPING NAME: XYLENES

DOT ID NUMBER: UN1307

ERG93

GUIDE 27

POTENTIAL HAZARDS

*FIRE OR EXPLOSION

Flammable/combustible material; may be ignited by heat, sparks or flames. Vapors may travel to a source of ignition and flash back. Container may explode in heat of fire. Vapor explosion hazard indoors, outdoors or in sewers. Runoff to sewer may create fire or explosion hazard. Material may be transported hot.

*HEALTH HAZARDS

May be poisonous if inhaled or absorbed through skin. Vapors may cause dizziness or suffocation. Contact may irritate or burn skin and eyes. Fire may produce irritating or poisonous gases. Runoff from fire control or dilution water may cause pollution.

EMERGENCY ACTION

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection. *Isolate for 1/2 mile in all directions if tank, rail car or tank truck is involved in fire. CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, CALL CHEMTREC AT 1-800-424-9300. If water pollution occurs, notify the appropriate authorities.

*FIRE

Small Fires: Dry chemical, CO₂, water spray or regular foam.
Large Fires: Water spray, fog or regular foam.
Move container from fire area if you can do it without risk. Apply cooling water to sides of containers that are exposed to flames until well after fire is out. Stay away from ends of tanks. For massive fire in cargo area, use unmanned hose holder or monitor nozzles; if this is impossible, withdraw from area and let fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire.

*SPILL OR LEAK

Shut off ignition sources; no flares, smoking or flames in hazard area. Stop leak if you can do it without risk. Water spray may reduce vapor; but it may not prevent ignition in closed spaces.
Small Spills: Take up with sand or other noncombustible absorbent material and place into containers for later disposal.
Large Spills: Dike far ahead of liquid spill for later disposal.

*FIRST AID

Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen. In case of contact with material, immediately flush eyes with running water for at least 15 minutes. Wash skin with soap and water. Remove and isolate contaminated clothing and shoes at the site.

DISCLAIMER: The data shown above on this chemical represents a best effort on the part of the compilers of the CHEMTOX database to obtain useful, accurate, and factual data. The use of these data shall be in accordance with the guidelines and limitations of the user's CHEMTOX license agreement. The COMPILERS of the CHEMTOX database shall not be held liable for inaccuracies or omissions within this database, or in any of its printed or displayed output forms.

TOXIC FIRE GASES: NA
ODOR DETECTED AT (ppm): 0.05 - 1.0 PPM
ODOR DESCRIPTION: PUNGENT AND SUFFOCATING Source: NYDH
% ODOR DETECTION: No data

----- REGULATIONS -----

DOT hazard class: 9 CLASS 9
DOT guide: 29
Identification number: UN2209
DOT shipping name: FORMALDEHYDE, SOLUTIONS
Packing group: III
Label(s) required: NONE
Special provisions: T1
Packaging exceptions: 173.155
Non bulk packaging: 173.204
Bulk packaging: 173.240
Quantity limitations-
Passenger air/rail: 100 L
Cargo aircraft only: 220 L
Vessel stowage: A
Other stowage provisions:

STCC NUMBER: 4940341, 4940342, 4913144, 4913145

CLEAN WATER ACT Sect.307: No
CLEAN WATER ACT Sect.311: Yes
CLEAN AIR ACT: CAA '90 Listed
CLEAN AIR ACT Sect 112 Toxic TQ=15000
HA WASTE NUMBER: U122
CERCLA REF: Y
RQ DESIGNATION: B 100 pounds (45.4 kg) CERCLA
SARA TPQ VALUE: 500 pounds
SARA Sect. 312
categories:

Acute toxicity: Irritant
Acute toxicity: adverse effect to target organs.
Chronic toxicity: carcinogen
Chronic toxicity: mutagen.
Chronic toxicity: reproductive toxin.
Reactive hazard: unstable/reactive.
Acute toxicity: Toxic. LD50 > 50 and <= 500 mg/kg (oral rat).
Acute toxicity: Toxic. LD50 > 50 and <= 500 mg/kg (oral rat).

LISTED IN SARA Sect 313: Yes
de minimus CONCENTRATION: 0.1 percent

UNITED STATES POSTAL SERVICE MAILABILITY:
Hazard class: Combustible liquid - Mailable as ORM-D
Mailability: Domestic surface mail only
Max per parcel: 1 GAL

NFPA CODES:

HEALTH HAZARD (BLUE): (2) Hazardous to health. Area may be entered with self-contained breathing apparatus.
FLAMMABILITY (RED) : (2) This material must be moderately heated before ignition will occur.
REACTIVITY (YELLOW): (0) Stable even under fire conditions.
SPECIAL : Unspecified

----- SUMMARY OF REGULATORY LISTS THIS SUBSTANCE APPEARS ON -----

ACGIH TLV list "Threshold Limit Values for 1992-1993"
California OSHA Carcinogens List.
California Assembly Bill 2588 Air Toxics "Hot Spots" Chemicals.
California Department of Health Services Drinking Water Action List.
California Assembly Bill 1807 Toxic Air Contaminants.
Canadian Domestic Substances List
Canadian Ingredient Disclosure List. 20/01/88 Canada Gazette part II, Vol 122.
Clean Air Act Section 111 List.
Clean Air Act Section 112(r) Accidental Release List -Toxics:TQ = 15000 lbs
Clean Air Act of November 15, 1990. List of pollutants.
Clean Water Act Section 311 Hazardous Chemicals List.
DOT Hazardous Materials Table. 49 CFR 172.101
EPA Carcinogen Assessment Group List
EPA List of VOC chemicals from 40 CFR 60.489
EPA TSCA Chemical Inventory List 1986
EPA TSCA Chemical Inventory List 1989
EPA TSCA Chemical Inventory List 1990
EPA TSCA Chemical Inventory List 1992
EPA TSCA Test Submission (TSCATS) Database - April 1990
EPA TSCA Test Submission (TSCATS) Database - September 1989
FORMALDEHYDE [50-00-0]
Massachusetts Substance List.
National Toxicology Program list of anticipated human carcinogens
New Jersey DEQ100 list for release reporting.
New Jersey Right To Know Substance List. (December 1987)
New Jersey Right to Know Substance List. Listed as a carcinogen.
New Jersey Right to Know Substance List. Listed as a mutagen.
OSHA Air Contaminant (Table Z-1-A). 54 FR 4332, Jan. 19, 1989 and revised.
OSHA Process Safety Rule chemical with a TQ. Effective May 26, 1992
OSHA Specifically regulated substance. See 29 CFR 1910.1048
Pennsylvania Hazardous Substance List
RCRA Hazardous Waste
SARA Section 110 Priority List of CERCLA Hazardous Substances
SARA Section 313 Toxic Chemicals List
SARA Title III Extremely Hazardous Substance. Sections 302 and 304.
Superfund/CERCLA RQ list. Table 302.4 in 54 FR 50968 (December 11, 1989)
Suspected carcinogen (ACGIH). "Threshold Limit Values for 1992-1993"
Washington State Discarded Chemical Products List, November 17, 1989
Wisconsin Air Toxics Control Regulation NR-445 (December 1988)

----- TOXICITY DATA -----

SHORT TERM TOXICITY: INHALATION: irritation of the nose and throat can occur after an exposure of 0.25 ppm to 0.45 ppm. levels between 0.4 ppm and 0.8 ppm can give rise to coughing and wheezing, tightness of the chest and shortness of breath. sudden exposures to concentrations of 4 ppm may lead to irritation of lung and throat severe enough to give rise to bronchitis and laryngitis. breathing may be impaired at levels above 10 ppm and serious lung damage may occur at 50 ppm. SKIN: direct contact with the liquid can lead to irritation, itching, burning and drying. it is also possible to develop an allergic reaction to the compound following exposure by any route. Eyes: exposure to airborne levels of formaldehyde of 0.4 ppm have brought on tearing and irritation. small amounts of liquid splashed in the eye can cause damage to the cornea. eye irritation was reported at levels between 0.05 - 2.0 ppm. INGESTION: as little as 1 liquid ounce has resulted in death to humans. smaller amounts can damage the throat, stomach and intestine resulting in nausea, vomiting, abdominal pain and diarrhea. accidental exposure may also cause loss of consciousness, lowered blood pressure, kidney damage and, if the person is pregnant, the possibility of the fetus being aborted. (NYDH)

LONG TERM TOXICITY: inhalation can result in respiratory congestion with associated coughing and shortness of breath. daily skin contact can lead to drying and scaling. some individuals may experience allergic reactions after initial contact with the chemical. subsequent contact may cause skin rashes and asthma and reactions may become more severe if exposure persists. long term inhalation of high levels of formaldehyde vapor (14 ppm) in rats resulted in an elevated incidence of cancer of the nose. genetic damage from exposure has been shown in bacteria and some insects. whether it causes these effects in humans is uncertain. (NYDH)

TARGET ORGANS: resp sys, lungs, eyes, skin, mucous membranes

SYMPTOMS: INHALATION: VAPORS ARE IRRITATING Source:

CONC IDLH: 30ppm

NIOSH REL: Potential occupational carcinogen 0.016 ppm Time weighted averages for 8-hour exposure 0.1 ppm Ceiling exposures which shall at no time be exceeded

ACGIH TLV: TLV = C 0.3ppm(C 0.37 mg/M3) A2

ACGIH STEL: Not listed

OSHA PEL: Final Rule Limits:

TWA = 0.75 ppm
STEL = 2 ppm
CONSULT 29CFR 1910.1048

MAK INFORMATION:

0.5 ppm
0.6 mG/M3
Local irritant: Peak = 2xMAK for 5 minutes, 8 times per shift.
Causes allergic reactions
There is no reason to fear a risk of damage to the developing embryo or fetus when MAK values are adhered to.
A compound which is justifiably suspected of having carcinogenic potential.

CARCINOGEN?:

Y STATUS: See below

REFERENCES:

ANIMAL POSITIVE IARC** 29,345,82
HUMAN INDEFINITE IARC** 29,345,82

CARCINOGEN LISTS:

IARC: Carcinogen defined by IARC to be probably carcinogenic to humans with (usually) at least limited human evidence.
MAK: A compound which is justifiably suspected of having carcinogenic potential.
NIOSH: Carcinogen defined by NIOSH with no further categorization.
NTP: Carcinogen defined by NTP as reasonably anticipated to be carcinogenic, with limited evidence in humans or sufficient evidence in experimental animals.
ACGIH: Carcinogen defined by ACGIH TLV Committee as a suspected carcinogen, based on either limited epidemiological evidence or demonstration of carcinogenicity in experimental animals.
OSHA: Cancer hazard - potential

HUMAN TOXICITY DATA: (Source: NIOSH RTECS)

orl-man TDLo:643 mg/kg JJTOEX 4,261,91
LUNGS, THORAX, OR RESPIRATION
Respiratory obstruction
GASTROINTESTINAL
Ulceration or bleeding from stomach
GASTROINTESTINAL
Nausea or vomiting

* orl-wmn LDLo:108 mg/kg 29ZWAE -,328,68

ihl-hmn TCLo:17 mg/m3/30M JAMAAP 165,1908,57
SENSE ORGANS
Eye
Lacrimation
LUNGS, THORAX, OR RESPIRATION
Other changes

orl-man TDLo:646 mg/kg JJTOEX 4,261,91
GASTROINTESTINAL
Gastritis
GASTROINTESTINAL
Ulceration or bleeding from stomach
GASTROINTESTINAL
Nausea or vomiting

ihl-man TCLo:300 ug/m3 GTPZAB 12(7),20,68
SENSE ORGANS
Nose
Other
BEHAVIORAL
Aggression

LD50 value: orl-rat LD50:100 mg/ kg

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1992)

orl-rat LD50:100 mg/kg
ihl-rat LC50:203 mg/m3
scu-rat LD50:420 mg/kg
ivn-rat LD50:87 mg/kg
orl-mus LD50:42 mg/kg
ihl-mus LC50:400 mg/m3/2H
ipr-mus LDLo:16 mg/kg
scu-mus LD50:300 mg/kg
scu-dog LDLo:350 mg/kg
ivn-dog LDLo:70 mg/kg
ihl-cat LCLo:400 mg/m3/2H
ivn-cat LDLo:30 mg/kg
skn-rbt LD50:270 mg/kg
scu-rbt LDLo:240 mg/kg
ivn-rbt LDLo:48 mg/kg
orl-gpg LD50:260 mg/kg
par-frg LDLo:800 mg/kg
ihl-mam LC50:92 mg/m3

IRRITATION DATA: (Source: NIOSH RTECS 1992)

skn-hmn 150 ug/3D-I MLD
eye-hmn 4 ppm/5M
skn-rbt 540 mg open MLD
skn-rbt 50 mg/24H MOD
eye-rbt 750 ug SEV

Reproductive toxicity (1992 RTECS):

This chemical is a mammalian reproductive toxin.

REPRODUCTIVE TOXICITY DATA (1992 RTECS)

orl-rat TDLo:168 mg/kg (1-21D preg) GISAAA 55(3),89,90
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Hapatobiliary system

orl-rat TDLo:200 mg/kg (1D male) TJADAB 26(3),14A,82
PATERNAL EFFECTS
Spermatogenesis

orl-rat TDLo:168 mg/kg (1-21D preg) GISAAA 55(4),36,90
EFFECTS ON NEWBORN

ihl-rat TCLo:1 mg/m³/24H (1-22D preg) HYSAAV
34(5),266,69
EFFECTS ON EMBRYO OR FETUS
Cytological changes(including somatic cell genetic
material)

ihl-rat TCLo:12 ug/m³/24H (15D pre/1-22D preg) HYSAAV
33(1-3),327,68
EFFECTS ON NEWBORN
Growth statistics(e.g.,reduced weight gain)
EFFECTS ON NEWBORN
Other postnatal measures or effects

ihl-rat TCLo:12 ug/m³/24h (1-22D preg) HYSAAV
33(7-9),112,68
EFFECTS ON NEWBORN

ihl-rat TCLo:35 ug/m³/8H (60D male) PRKHDK 4,101,79
PATERNAL EFFECTS
Spermatogenesis
PATERNAL EFFECTS
Other effects on male

ihl-rat TCLo:12 ug/m³/24H (20D pre/1-22D preg) BEXBAN
66,868,68
EFFECTS ON NEWBORN

ihl-rat TCLo:50 ug/m³/4H (1-19D preg) TPKVAL 12,78,71
EFFECTS ON NEWBORN
Behavioral

ipr-rat TDLo:80 mg/kg (10D male) JRBED2 7,42,87
PATERNAL EFFECTS
Testes,epididymis,sperm duct
PATERNAL EFFECTS

Prostate, seminal vessel, Cowper's gland, accessory glands, urethra

scu-rat TDLo:46243 mg/kg (20D male) ENDOAO 28,129,41
PATERNAL EFFECTS
Testes, epididymis, sperm duct

itt-rat TDLo:400 mg/kg (1D male) FESTAS 24,884,73
EFFECTS ON FERTILITY
Male fertility index

ipr-mus TDLo:240 mg/kg (7-14D preg) TJADAB 28,37A,83
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death, e.g., stunted fetus)
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Craniofacial(including nose and tongue)
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

ipr-mus TDLo:240 mg/kg (7-14D preg) TJADAB 30(1),34A,84
EFFECTS ON EMBRYO OR FETUS
Fetal death

ipr-mus TDLo:160 mg/kg (7-14D preg) TJADAB 30(1),34A,84
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Other developmental abnormalities

ipr-mus TDLo:500 mg/kg (5D male) MUREAV 130,417,84
PATERNAL EFFECTS
Spermatogenesis

ims-mus TDLo:259 mg/kg (11D preg) ANREAK 142,479,62
EFFECTS ON FERTILITY
Post-implantation mortality
EFFECTS ON EMBRYO OR FETUS
Fetal death

itt-dog TDLo:7 mg/kg (1D male) AEFTAA 6,349,75
PATERNAL EFFECTS
Testes, epididymis, sperm duct

itt-mky TDLo:4 mg/kg (1D male) FESTAS 41,465,84
PATERNAL EFFECTS
Spermatogenesis

California Prop 65: Carcinogen (01/01/88)
No significant risk level 40. ugD (01/01/94)

----- EPA's IRIS DATA SUMMARY -----
Formaldehyde; CASRN 50-00-0 (04/01/92)

_II. CARCINOGENICITY ASSESSMENT FOR LIFETIME EXPOSURE

Substance Name -- Formaldehyde
CASRN -- 50-00-0
Last Revised -- 05/01/91

Section II provides information on three aspects of the carcinogenic risk assessment for the agent in question; the U.S. EPA classification, and quantitative estimates of risk from oral exposure and from inhalation exposure. The classification reflects a weight-of-evidence judgment of the likelihood that the agent is a human carcinogen. The quantitative risk estimates are presented in three ways. The slope factor is the result of application of a low-dose extrapolation procedure and is presented as the risk per (mg/kg)/day. The unit risk is the quantitative estimate in terms of either risk per ug/L drinking water or risk per ug/cu.m air breathed. The third form in which risk is presented is a drinking water or air concentration providing cancer risks of 1 in 10,000, 1 in 100,000 or 1 in 1,000,000. Background Document 2 (Service Code 5) provides details on the rationale and methods used to derive the carcinogenicity values found in IRIS. Users are referred to Section I for information on long-term toxic effects other than carcinogenicity.

__II.A. EVIDENCE FOR CLASSIFICATION AS TO HUMAN CARCINOGENICITY

___II.A.1. WEIGHT-OF-EVIDENCE CLASSIFICATION

Classification -- B1; probable human carcinogen, based on limited evidence in humans, and sufficient evidence in animals. Human data include nine studies that show statistically significant associations between site-specific respiratory neoplasms and exposure to formaldehyde or formaldehyde-containing products. An increased incidence of nasal squamous cell carcinomas was observed in long-term inhalation studies in rats and in mice. The classification is supported by in vitro genotoxicity data and formaldehyde's structural relationships to other carcinogenic aldehydes such as acetaldehyde.

___II.A.2. HUMAN CARCINOGENICITY DATA

Limited. At least 28 relevant epidemiologic studies have been conducted. Among these, two cohort studies (Blair et al., 1986, 1987; Stayner et al., 1988) and one case-control study (Vaughan et al., 1986a,b) were well-conducted and specifically designed to detect small to moderate increases in formaldehyde-associated human risks. Blair et al. studied workers at 10 plants who were in some way exposed to formaldehyde (largely through resin formation) and observed significant excesses in lung and nasopharyngeal cancer deaths. Despite a lack of significant trends with increasing concentration or cumulative formaldehyde exposure, lung cancer mortality was significantly elevated in analyses with or without a 20-year latency allowance. No explicit control was made for smoking status. Stayner et al. reported statistically significant excesses in mortality from buccal cavity tumors among formaldehyde-exposed garment workers. The highest SMR was for workers with long employment duration (exposure) and follow-up period (latency). The

Vaughan et al. nasal and pharyngeal cancer case-control study examined occupational and residential exposures, controlling for smoking and alcohol consumption. It showed a significant association between nasopharyngeal cancer and having lived 10 or more years in a mobile home, especially for mobile homes built in the 1950s to 1970s, a period of increasing formaldehyde-resin usage. No exposure measurements were available.

The 25 other reviewed studies had limited ability to detect small to moderate increases in formaldehyde risks owing to small sample sizes, small numbers of observed site-specific deaths, and insufficient follow-up. Even with these potential limitations, 6 of the 25 studies (Acheson et al., 1984; Hardell et al., 1982; Hayes et al., 1986; Liebling et al., 1984; Olsen et al., 1984; Stayner et al., 1985) reported significant associations between excess site-specific respiratory (lung, buccal cavity, and pharyngeal) cancers and exposure to formaldehyde. Some of these studies looked at potential confounders (such as wood-dust exposure) in greater detail; they did not discern sinonasal cancer incidence excesses of the size predicted. Others (Liebling et al., 1984; Stayner et al., 1985) overlapped the Acheson et al. (1984), Hardell et al. (1982) and Hayes et al. (1986) studies; the improved design and nonoverlapping portions of the later studies (Blair et al., 1986; Stayner et al., 1988) reinforce the conclusions of the earlier studies. Analysis of the remaining 19 studies indicate that leukemia and neoplasms of the brain and colon may be associated with formaldehyde exposure. The biological support for such postulates, however, has not yet been demonstrated. Although the common exposure in all of these studies was formaldehyde, the epidemiologic evidence is categorized as "limited" primarily because of the possible exposures to other agents. Such exposures could have contributed to the findings of excess cancers.

II.A.3. ANIMAL CARCINOGENICITY DATA

Sufficient. Consequences of inhalation exposure to formaldehyde have been studied in rats, mice, hamsters and monkeys. The principal evidence comes from positive studies in both sexes of two strains of rats (Kerns et al., 1983; Albert et al., 1982; Tobe et al., 1985) and males of one strain of mice (Kerns et al., 1983), all showing squamous cell carcinomas.

For the CIIT, Kerns et al. (1983) exposed about 120 animals/sex/species (Fischer 344 rats and B6C3F1 mice) to 0, 2, 5.6 or 14.3 ppm, 6 hours/day, 5 days/week for 24 months. Five animals per group were sacrificed at 6 and 12 months and 20 per group were killed at 18 months. At 24 and 27 months the number sacrificed is unclear. The studies were terminated at 30 months. From the 12th month on, male and female rats in the highest dose group (14.3 ppm) showed significantly increased mortality compared with controls. In the 5.6-ppm group, male rats showed a significant increase in mortality from 17 months on. Female mice showed generally comparable survival across dose groups, as did male mice, but the male mice as a whole showed increased mortality because of housing problems. Squamous cell carcinomas were seen in the nasal cavities of 51/117 male rats and 52/115 female rats at 14.3 ppm (HDT) by experiment's end (as many as 35 carcinomas had been identified in males by month 18 based on EPA analysis notes and Kerns (Chart 8). At 5.6 ppm, 1/119 male rats and

1/116 female rats showed squamous cell carcinomas of the nasal cavity. No such tumors were seen at 0 or 2 ppm. Polypoid adenomas of the nasal mucosa were seen in rats at all doses (0 ppm: 1/118 M, 0/114 F; 2 ppm: 4/118 M, 4/118 F; 5.6 ppm: 6/119 M, 0/116 F; 14.3 ppm: 4/117 M, 1/115 F) in a significant dose-related trend, albeit one that falls off after a peak. Among the mice, squamous cell carcinomas were seen in two males at 14.3 ppm. No other lesions were noteworthy.

Sellakumar et al. (1985) exposed male Sprague-Dawley rats, 100/group, 6 hours/day, 5 days/week for lifetime to 10 ppm HCl and to 14 ppm formaldehyde. This was a combined exposure HCl and formaldehyde were administered simultaneously, and each was administered separately. An equal number of rats received an air control. HCl was administered to determine if tumor response was enhanced by an additional irritant effect or by the combining of formaldehyde and HCl to form bis-(chloromethyl)ether (BCME). Groups receiving formaldehyde alone or with HCl showed an increase in nasal squamous cell carcinomas; those without formaldehyde were free of carcinomas and other tumors (0/99 in each group), although rhinitis and hyperplasia were of comparable incidence.

Tobe et al. (1985) conducted a 28-month study of male Fischer 344 rats (about 2 weeks younger than those in Kerns et al., 1983). Groups of 32 rats were exposed 6 hours/day, 5 days/week to 0, 0.3, 2.0, 3,3, or 15 ppm formaldehyde in aqueous solution methanol; another group of 32 was exposed to methanol only (vehicle control). Animals were sacrificed at 12, 18, and 24 months. Exposure to 15 ppm ended at 24 months; at that point, mortality was 88%. At 28 months mortality was 60% in the control group and 32% in the 0.3 dose group. Squamous cell carcinomas were seen at 15 ppm in 14/27 rats surviving past 12 months, compared with 0/27 in the controls. No polypoid adenomas were observed; the increased incidences of rhinitis and hyperplasia were dose-related.

While these three rodent studies are principal in the weight of evidence, inhalation studies have been carried out in other strains and species. Dalbey (1982), as part of a promotion experiment, exposed male Syrian golden hamsters to 10 ppm formaldehyde 5 times/week, 5 hours/day throughout their lifetimes, 132 animals were untreated controls. Although survival time was significantly reduced in the treated group, no tumors were observed in either treated or control groups. Rusch et al. (1983) carried out a 6-month toxicity study in 6 male cynomolgus monkeys, 40 F344 rats (20M, 20F), and 20 Syrian golden hamsters (10M, 10F) with 22 hours/day, 7 days/week exposure to three levels of formaldehyde with corresponding controls. The highest dose tested was 2.95 ppm. The short duration of the assay, the small sample sizes, and, possibly, the low concentrations tested, limited the sensitivity of the assay to detect tumors. In the highest dose group in both rats and monkeys, incidences of squamous metaplasia/hyperplasia of the nasal turbinates were significantly elevated.

II.A.4. SUPPORTING DATA FOR CARCINOGENICITY

Mutagenic activity of formaldehyde has been demonstrated in viruses,

Escherichia coli, Pseudomonas fluorescens, Salmonella typhimurium and certain strains of yeast, fungi, Drosophila, grasshopper and mammalian cells (Ulsamer et al., 1984). Formaldehyde has been shown to cause gene mutations, single strand breaks in DNA, DNA-protein crosslinks, sister chromatid exchanges and chromosomal aberrations. Formaldehyde produces in vitro transformation in BALB/c 3T3 mouse cells, BHK21 hamster cells and C3H-10T1/2 mouse cells, enhances the transformation of Syrian hamster embryo cells by SA7 adenovirus, and inhibits DNA repair (Consensus Workshop on Formaldehyde, 1984).

When inhaled, acetaldehyde, the closest aldehyde to formaldehyde in structure, causes cancers in the nose and trachea of hamsters, and nasal cancers in rats.

__II.B. QUANTITATIVE ESTIMATE OF CARCINOGENIC RISK FROM ORAL EXPOSURE

None.

__II.C. QUANTITATIVE ESTIMATE OF CARCINOGENIC RISK FROM INHALATION EXPOSURE

__II.C.1. SUMMARY OF RISK ESTIMATES

Inhalation Unit Risk -- $1.3E-5$ per (ug/cu.m)

Extrapolation Method -- Linearized multistage procedure, additional risk

Air Concentrations at Specified Risk Levels:

Risk Level	Concentration
-----	-----
E-4 (1 in 10,000)	$8E+0$ ug/cu.m
E-5 (1 in 100,000)	$8E-1$ ug/cu.m
E-6 (1 in 1,000,000)	$8E-2$ ug/cu.m

__II.C.2. DOSE-RESPONSE DATA FOR CARCINOGENICITY, INHALATION EXPOSURE

Tumor Type -- squamous cell carcinoma

Test Animals -- Rat/F344, males

Route -- inhalation

Reference -- Kerns et al., 1983

----- Dose ----- Tumor

Admin- istered (ppm)	Human Equivalent (mg/kg/day)	Incidence
-----	-----	-----
0	0	0/156
2	2	0/159
5.6	5.6	2/153
14.3	14.3	94/140

II.C.3. ADDITIONAL COMMENTS (CARCINOGENICITY, INHALATION EXPOSURE)

In the Kerns et al. (1983) study, rats that died at 11 months (prior to appearance of the first squamous cell carcinoma) were not considered at risk. Those sacrificed at 12 and 18 months were treated as though they would have responded in the same proportion as rats remaining alive at the respective sacrifice times and those living beyond 24 months were included with animals sacrificed at 24 months. From the estimates of the probability of death with tumor within 24 months and its variance, the number of animals at risk and the number with tumors were derived for a 24-month study with no 12- or 18-month kills. These rounded numbers are shown above and were used for significance tests and modeling.

The unit risk should not be used if the air concentration exceeds 8E+2 ug/cu.m, since above this concentration the unit risk may not be appropriate.

II.C.4. DISCUSSION OF CONFIDENCE (CARCINOGENICITY, INHALATION EXPOSURE)

The experimental range is close to expected human exposures. Estimated lifetime excess risks from six epidemiologic studies are close to upper bound risks based on animal data (usually within 1 order of magnitude for four types of estimated occupational and residential exposure). Animal-based estimates derived using time in the model were similar but would have required the use of more assumptions in the calculations. Three non-zero doses were used in addition to controls in the study on which calculations are based, with a large number of animals per group. Male and female incidences were close throughout the exposure groups.

II.D. EPA DOCUMENTATION, REVIEW, AND CONTACTS (CARCINOGENICITY ASSESSMENT)

II.D.1. EPA DOCUMENTATION

U.S. EPA. 1987. Assessment of Health Risk to Garment Workers and Certain Home Residents from Exposure to Formaldehyde. Office of Toxic Substances,

Washington, DC.

___II.D.2. REVIEW (CARCINOGENICITY ASSESSMENT)

The OTS Assessment of Health Risk has received wide internal and external review.

Agency Work Group Review: 02/03/88

Verification Date: 02/03/88

___II.D.3. U.S. EPA CONTACTS (CARCINOGENICITY ASSESSMENT)

R. Hefter / OPTS -- (202)260-6712 / FTS 260-6712

E. Margosches / OTS -- (202)260-1511 / FTS 260-1511

----- PROTECTION AND FIRST AID -----

PROTECTION SUGGESTED
FROM THE CHRIS MANUAL:

self-contained breathing apparatus; chemical goggles; protective clothing; synthetic rubber or plastic gloves.

NIOSH POCKET GUIDE TO CHEMICAL HAZARDS:

** WEAR APPROPRIATE EQUIPMENT TO PREVENT:
Reasonable probability of skin contact.

** WEAR EYE PROTECTION TO PREVENT:
Any possibility of eye contact.

** EXPOSED PERSONNEL SHOULD WASH:
Immediately when skin becomes contaminated.

** REMOVE CLOTHING:
Immediately remove non-impervious clothing that becomes contaminated.

** THE FOLLOWING EQUIPMENT SHOULD BE MADE AVAILABLE:
Eyewash, quick drench.

** REFERENCE: NIOSH

RECOMMENDED RESPIRATION PROTECTION Source: NIOSH POCKET GUIDE (85-114)
OSHA (FORMALDEHYDE)

Up to 7.5 ppm: Full facepiece with cartridge or canisters specifically approved for protection against formaldehyde. A half-mask respirator with

cartridges specifically approved for protection against formaldehyde can be substituted for the full facepiece respirator providing the effective gas-proof goggles are provided and used in combination with the half-mask respirator.

Up to 75 ppm: Full-face mask, chest or back mounted type, with industrial size canister specifically approved for protection against formaldehyde. Type C supplied air respirator, demand type, with full facepiece, hood, or helmet.

Above 75 ppm or in known emergencies : Self-contained breathing apparatus (SCBA) with positive pressure full facepiece. Combination supplied-air, full facepiece positive pressure respirator with auxiliary self-contained air supply.

Firefighting : SCBA with positive pressure in full face-piece.

Escape : SCBA in demand or pressure demand mode. Full-face mask, front or back mounted type with industrial size canister specifically approved for protection against formaldehyde.

FIRST AID SOURCE: DOT Emergency Response Guide 1990.

Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Remove and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature.

----- INITIAL INCIDENT RESPONSE -----

FIRE EXTINGUISHMENT: TO FIGHT FIRE: STOP FLOW OF GAS (FOR PURE FORM);
ALCOHOL FOAM FOR 37% METHANOL FORM. Note: CHRIS91

US Department of Transportation Guide to Hazardous Materials Transport Information - Publication DOT 5800.5 (1990).

DOT SHIPPING NAME: FORMALDEHYDE, SOLUTIONS

DOT ID NUMBER: UN2209

ERG93

GUIDE 29

POTENTIAL HAZARDS

*FIRE OR EXPLOSION

Flammable/combustible material; may be ignited by heat, sparks or flames. Vapors may travel to a source of ignition and flash back.

Container may explode in heat of fire.

Vapor explosion hazard indoors, outdoors or in sewers.

Runoff to sewer may create fire or explosion hazard.

*HEALTH HAZARDS

May be poisonous if inhaled.

Contact may cause burns to skin and eyes.

Fire may produce irritating or poisonous gases.

Runoff from fire control or dilution water may cause pollution.

EMERGENCY ACTION

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection. See the Table of Initial

Isolation and Protective Action Distances. If you find the ID Number and the name of the material there, begin protective action.

*Isolate for 1/2 mile in all directions if tank, rail car or tank truck is involved in fire. CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, CALL CHEMTREC AT 1-800-424-9300. If water pollution occurs, notify the appropriate authorities.

*FIRE

Some of these materials may react violently with water.

Small Fires: Dry chemical, CO₂, water spray or regular foam.

Large Fires: Water spray, fog or regular foam.

Move container from fire area if you can do it without risk.

Do not get water inside container.

Apply cooling water to sides of containers that are exposed to flames until well after fire is out. Stay away from ends of tanks. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire.

*SPILL OR LEAK

Shut off ignition sources; no flares, smoking or flames in hazard area. Do not touch or walk through spilled material; stop leak if you can do it without risk.

*Use water spray to reduce vapor; do not get water inside container.

Small Spills: Take up with sand or other noncombustible absorbent material and place into containers for later disposal.

Large Spills: Dike far ahead of liquid spill for later disposal.

*FIRST AID

Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen. In case of contact with material, immediately flush skin and eyes with running water for at least 15 minutes. Remove and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature.

DISCLAIMER: The data shown above on this chemical represents a best effort on the part of the compilers of the CHEMTOX database to obtain useful, accurate, and factual data. The use of these data shall be in accordance with the guidelines and limitations of the user's CHEMTOX license agreement. The COMPILERS of the CHEMTOX database shall not be held liable for inaccuracies or omissions within this database, or in any of its printed or displayed output forms.

Special provisions: B1, B52, T7, T30
Packaging exceptions: 173.150
Non bulk packaging: 173.203
Bulk packaging: 173.242
Quantity limitations-
Passenger air/rail: 60 L
Cargo aircraft only: 220 L
Vessel stowage: A
Other stowage provisions:

STCC NUMBER: Not listed

CLEAN WATER ACT Sect.307:No
CLEAN WATER ACT Sect.311:No
CLEAN AIR ACT: Not listed
EPA WASTE NUMBER: D001
CERCLA REF: Not listed
RQ DESIGNATION: Not listed
SARA TPQ VALUE: Not listed
SARA Sect. 312
categories:

Acute toxicity: Irritant
Acute toxicity: adverse effect to target organs.
Fire hazard: flammable.

UNITED STATES POSTAL SERVICE MAILABILITY:
Not given

NFPA CODES:

HEALTH HAZARD (BLUE): (0) No unusual health hazard.
FLAMMABILITY (RED) : (2) This material must be moderately heated before
ignition will occur.
REACTIVITY (YELLOW): (0) Stable even under fire conditions.
SPECIAL : Unspecified

----- SUMMARY OF REGULATORY LISTS THIS SUBSTANCE APPEARS ON -----

ACGIH TLV list "Threshold Limit Values for 1992-1993"
Canadian Domestic Substances List
Canadian Ingredient Disclosure List. 20/01/88 Canada Gazette part II, Vol 122.
EPA TSCA Chemical Inventory List 1989
EPA TSCA Chemical Inventory List 1990
EPA TSCA Chemical Inventory List 1992
EPA TSCA Test Submission (TSCATS) Database - April 1990
EPA TSCA Test Submission (TSCATS) Database - September 1989
Massachusetts Substance List.
New Jersey Right To Know Substance List. (December 1987)
OSHA Air Contaminant (Table Z-1-A). 54 FR 4332, Jan. 19, 1989 and revised.
OSHA Process Safety Rule chemical with a TQ. Effective May 26, 1992

Pennsylvania Hazardous Substance List

RCRA Hazardous Waste

STODDARD SOLVENT [8052-41-3]

Wisconsin Air Toxics Control Regulation NR-445 (December 1988)

----- TOXICITY DATA -----

SHORT TERM TOXICITY: INHALATION: exposure to levels above 2400 mg/m³ may cause headache, dizziness and nose and throat irritation. more severe exposures may cause nausea and vomiting, a feeling of intoxication, weakness, muscle twitches and in extreme cases convulsions, unconsciousness and death. SKIN: contact with liquid may cause irritation and drying of skin. this can result in dermatitis. Eyes: contact with liquid or vapor levels of 900 mg/m³ to 2400 mg/m³ may cause irritation and tearing. INGESTION: small amounts may cause headache, dizziness, nausea, vomiting, intoxication, weakness, muscle twitches, convulsions and unconsciousness. as little as 3 ounces may be fatal. if liquid is breathed into the lungs as little as 1 ounce may cause death due to respiratory failure. (NYDH)

LONG TERM TOXICITY: prolonged or repeated contact with liquid may cause drying, and irritation of the skin and jaundice. exposure to vapor may cause eye, nose and throat irritation, fatigue, headaches, anemia and damage to the liver and bone marrow. (NYDH)

TARGET ORGANS: eyes, skin, respiratory system, CNS.

SYMPTOMS: HIGH CONCENTRATION OF VAPORS MAY CAUSE INTOXICATION. IF LIQUID IS SWALLOWED, IT MAY GET INTO LUNGS BY ASPIRATION; NOT VERY IRRITATING TO SKIN OR EYES. IRRITATION OF EYES, NOSE, THROAT, DIZZINESS, DERMATITIS. Source: HTHC, CHRIS

CONC IDLH: 29500mg/M³

NIOSH REL: 350 mg/M³ Time weighted averages for 8-hour exposure
1800 mg/M³ Ceiling exposures which shall at no time be exceeded

ACGIH TLV: TLV = 100ppm(525 mg/M³)

ACGIH STEL: Not listed

OSHA PEL: Transitional Limits:
PEL = 500 ppm(2900mg/M³)
Final Rule Limits:
TWA = 100 ppm (525 mg/M³)

MAK INFORMATION: Not listed

MUTAGENICITY?: N STATUS: See below

CARCINOGEN LISTS:

IARC: Not listed
MAK: Not listed
NIOSH: Not listed
NTP: Not listed
ACGIH: Not listed
OSHA: Not listed

LD50 value: orl-rat LD50:>5 gm/ kg

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1992)

orl-rat LD50:>5 gm/kg
ihl-rat LC50:>5500 mg/m3/4H
ihl-dog LC :>8 gm/m3/8H-C
ihl-cat LCLo:1700 ppm/7H

IRRITATION DATA: (Source: NIOSH RTECS 1992)

Reproductive toxicity (1992 RTECS):

This chemical has no known mammalian reproductive toxicity.

MUTAGENICITY DATA (1992 RTECS)

California Prop 65: Not listed

----- PROTECTION AND FIRST AID -----

PROTECTION SUGGESTED

FROM THE CHRIS MANUAL:

goggles or face shield (as for gasoline).

NIOSH POCKET GUIDE TO CHEMICAL HAZARDS:

** WEAR APPROPRIATE EQUIPMENT TO PREVENT:
Repeated or prolonged skin contact.

** WEAR EYE PROTECTION TO PREVENT:
Reasonable probability of eye contact.

** EXPOSED PERSONNEL SHOULD WASH:
Promptly when skin becomes wet.

** REMOVE CLOTHING:
Promptly remove non-impervious clothing that becomes wet.

** REFERENCE: NIOSH

RECOMMENDED RESPIRATION PROTECTION Source: NIOSH POCKET GUIDE (85-114)
NIOSH (STODDARD SOLVENT)

3500 mg/M3: Any supplied-air respirator. * Substance reported to cause eye irritation or damage may require eye protection. / Any self-contained breathing apparatus. * Substance reported to cause eye irritation or damage may require eye protection. / Any chemical cartridge respirator with organic vapor cartridge(s). * Substance reported to cause eye irritation or damage may require eye protection.

5900 mg/M3: Any powered air-purifying respirator with organic vapor cartridge(s). * Substance reported to cause eye irritation or damage may require eye protection. / Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s).

14750 mg/M3: Any supplied-air respirator operated in a continuous flow mode. * Substance reported to cause eye irritation or damage may require eye protection.

29500 mg/M3: Any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister. / Any self-contained breathing apparatus with a full facepiece. / Any supplied-air respirator with a full facepiece.

EMERGENCY OR PLANNED ENTRY IN UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS.: Any self-contained breathing apparatus with full facepiece and operated in a pressure-demand or other positive pressure mode. / Any supplied-air respirator with a full facepiece and operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.

ESCAPE: Any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister. / Any appropriate escape-type self-contained breathing apparatus.

FIRST AID SOURCE: DOT Emergency Response Guide 1990.

Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen. In case of contact with material, immediately flush eyes with running water for at least 15 minutes. Wash skin with soap and water. Remove and isolate contaminated clothing and shoes at the site.

----- INITIAL INCIDENT RESPONSE -----

US Department of Transportation Guide to Hazardous Materials Transport Information - Publication DOT 5800.5 (1990).

DOT SHIPPING NAME: FLAMMABLE LIQUID, N.O.S. (STODDARD SOLVENT)

DOT ID NUMBER: UN1993

ERG93

GUIDE 27

POTENTIAL HAZARDS

*FIRE OR EXPLOSION

Flammable/combustible material; may be ignited by heat, sparks or flames. Vapors may travel to a source of ignition and flash back.

Container may explode in heat of fire.

Vapor explosion hazard indoors, outdoors or in sewers.

Runoff to sewer may create fire or explosion hazard.
Material may be transported hot.

***HEALTH HAZARDS**

May be poisonous if inhaled or absorbed through skin.
Vapors may cause dizziness or suffocation.
Contact may irritate or burn skin and eyes.
Fire may produce irritating or poisonous gases.
Runoff from fire control or dilution water may cause pollution.

EMERGENCY ACTION

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection. *Isolate for 1/2 mile in all directions if tank, rail car or tank truck is involved in fire. CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, CALL CHEMTREC AT 1-800-424-9300. If water pollution occurs, notify the appropriate authorities.

***FIRE**

Small Fires: Dry chemical, CO₂, water spray or regular foam.
Large Fires: Water spray, fog or regular foam.
Move container from fire area if you can do it without risk. Apply cooling water to sides of containers that are exposed to flames until well after fire is out. Stay away from ends of tanks. For massive fire in cargo area, use unmanned hose holder or monitor nozzles; if this is impossible, withdraw from area and let fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire.

***SPILL OR LEAK**

Put off ignition sources; no flares, smoking or flames in hazard area. Stop leak if you can do it without risk. Water spray may reduce vapor; but it may not prevent ignition in closed spaces.
Small Spills: Take up with sand or other noncombustible absorbent material and place into containers for later disposal.
Large Spills: Dike far ahead of liquid spill for later disposal.

***FIRST AID**

Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen. In case of contact with material, immediately flush eyes with running water for at least 15 minutes. Wash skin with soap and water. Remove and isolate contaminated clothing and shoes at the site.

DISCLAIMER: The data shown above on this chemical represents a best effort on the part of the compilers of the CHEMTOX database to obtain useful, accurate, and factual data. The use of these data shall be in accordance with the guidelines and limitations of the user's CHEMTOX license agreement. The COMPILERS of the CHEMTOX database shall not be held liable for inaccuracies or omissions within this database, or in any of its printed or displayed output forms.

Identification number:
DOT shipping name:
Packing group:
Label(s) required:
Special provisions:
Packaging exceptions: 173.
Non bulk packaging: 173.
Bulk packaging: 173.
Quantity limitations-
Passenger air/rail:
Cargo aircraft only:
Vessel stowage:
Other stowage provisions:

STCC NUMBER: Not listed

CLEAN WATER ACT Sect.307:No
CLEAN WATER ACT Sect.311:No
CLEAN AIR ACT: CAA '90 Listed
EPA WASTE NUMBER: None
CERCLA REF: Not listed
RQ DESIGNATION: Not listed
SARA TPQ VALUE: Not listed
SARA Sect. 312
categories:

Acute toxicity: Irritant
Acute toxicity: adverse effect to target organs.
Chronic toxicity: adverse effect to target organ
after long period of exposure.
Chronic toxicity: reproductive toxin.

LISTED IN SARA Sect 313: Yes
de minimus CONCENTRATION: 1.0 percent

UNITED STATES POSTAL SERVICE MAILABILITY:
Not given

NFPA CODES:

HEALTH HAZARD (BLUE): (1) Slightly hazardous to health. As a precaution
wear self-contained breathing apparatus.
FLAMMABILITY (RED) : (1) This material must be preheated before ignition
can occur.
REACTIVITY (YELLOW): (0) Stable even under fire conditions.
SPECIAL : Unspecified

----- SUMMARY OF REGULATORY LISTS THIS SUBSTANCE APPEARS ON -----

ACGIH TLV list "Threshold Limit Values for 1992-1993"
California Assembly Bill 1803 Well Monitoring Chemicals.
Canadian Domestic Substances List

Canadian Ingredient Disclosure List. 20/01/88 Canada Gazette part II, Vol 122.
Clean Air Act Section 111 List.
Clean Air Act of November 15, 1990. List of pollutants.
A List of VOC chemicals from 40 CFR 60.489
EPA TSCA Chemical Inventory List 1986
EPA TSCA Chemical Inventory List 1989
EPA TSCA Chemical Inventory List 1990
EPA TSCA Chemical Inventory List 1992
EPA TSCA Test Submission (TSCATS) Database - April 1990
EPA TSCA Test Submission (TSCATS) Database - September 1989
ETHYLENE GLYCOL [107-21-1]
Massachusetts Substance List.
New Jersey Right To Know Substance List. (December 1987)
OSHA Air Contaminant (Table Z-1-A). 54 FR 4332, Jan. 19, 1989 and revised.
Pennsylvania Hazardous Substance List
SARA Section 313 Toxic Chemicals List
Wisconsin Air Toxics Control Regulation NR-445 (December 1988)

----- TOXICITY DATA -----

SHORT TERM TOXICITY: INHALATION: mild throat irritation resulted from exposures of 28 mg/m³. levels above 140 mg/m³ resulted in more marked irritation, with levels of more than 250 mg/m³ being unbreathable. these levels are only reached at elevated temperatures. SKIN: may cause mild irritation if not promptly removed. Eyes: accidental eye contact with concentrated ethylene glycol resulted in extreme swelling of the eye, cloudy vision and slow response to light. these symptoms lasted a month. INGESTION: may cause symptoms in the nervous system, heart, lungs and kidneys. earliest effects are usually felt in the nervous system between 1/2 to 12 hours after ingestion. symptoms from 1 liquid ounce may include nausea, vomiting, dizziness, loss of coordination and abdominal pain. large amounts may cause stupor, coma, convulsions and death. survival of this stage may lead to development of rapid heart beat, enlarged heart and fluid in the lungs which, too, can lead to death usually after 1 to 3 days. some individuals who drank 3 to 4 fluid ounces who survived both the above stages because of prompt medical treatment, later (3 to 17 days) died of kidney failure. (NYDH)

LONG TERM TOXICITY: occupational exposure to heated ethylene glycol has caused involuntary eye movement that may indicate nerve damage. some individuals also reported attacks of unconsciousness lasting 5 to 10 minutes which went away when they stopped working with ethylene glycol. (NYDH)

TARGET ORGANS: eyes, skin, resp system

SYMPTOMS: Inhalation of vapor is not hazardous. Ingestion causes stupor or coma, sometimes leading to fatal kidney injury. Source: CHRIS

CONC IDLH: None given

NIOSH REL:

ACGIH TLV: TLV = C 50ppm(C 127 mg/M3) VAPOR AND MIST
ACGIH STEL: Not listed

OSHA PEL: Final Rule Limits:
CEILING = 50 ppm (125 mg/M3)

MAK INFORMATION: 10 ppm
26 mG/M3
Local irritant: Peak = 2xMAK for 5 minutes, 8 times per shift.
Danger of cutaneous absorption
There is no reason to fear a risk of damage to the developing embryo or fetus when MAK values are adhered to.

CARCINOGEN?: N STATUS: See below

CARCINOGEN LISTS:
IARC: Not listed
MAK: Not listed
NIOSH: Not listed
NTP: Not listed
ACGIH: Not listed
OSHA: Not listed

HUMAN TOXICITY DATA: (Source: NIOSH RTECS)
orl-chd TDLo:5500 mg/kg PGMJAO 52,598,76
BEHAVIORAL
General anesthetic
LUNGS, THORAX, OR RESPIRATION
Respiratory stimulation
KIDNEY, URETER, BLADDER
Other changes

orl-hmn LDLo:786 mg/kg EJTXAZ 9,373,76
BEHAVIORAL
Convulsions or effect on seizure threshold
BEHAVIORAL
Coma
GASTROINTESTINAL
Hypermotility, diarrhea

orl-hmn LDLo:398 mg/kg SMEZA5 26(2),48,83

BEHAVIORAL
Headache
GASTROINTESTINAL
Nausea or vomiting
LIVER
Other changes

ihl-hmn TCLo:10000 mg/m3 AGGHAR 5,1,33
SENSE ORGANS
Eye
Lacrimation
LUNGS, THORAX, OR RESPIRATION
Cough
LUNGS, THORAX, OR RESPIRATION
Other changes

LD50 value: orl-rat LD50:4700 mg/ kg

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1992)

orl-rat LD50:4700 mg/kg
ihl-rat LC :>198 mg/m3
ipr-rat LD50:5010 mg/kg
scu-rat LD50:2800 mg/kg
ivn-rat LD50:3260 mg/kg
ims-rat LDLo:3300 mg/kg
unr-rat LD50:13 gm/kg
orl-mus LD50:7500 mg/kg
ipr-mus LD50:5614 mg/kg
scu-mus LDLo:2700 mg/kg
ivn-mus LD50:3 gm/kg
unr-mus LD50:8050 mg/kg
orl-dog LD50:5500 mg/kg
orl-cat LD50:1650 mg/kg
scu-cat LDLo:2000 mg/kg
skn-rbt LD50:9530 mg/kg
ipr-rbt LDLo:1 gm/kg
ivn-rbt LDLo:5 gm/kg
ims-rbt LDLo:5500 mg/kg
unr-rbt LD50:5017 mg/kg
orl-gpg LD50:6610 mg/kg
scu-gpg LDLo:5 gm/kg
unr-gpg LD50:11150 mg/kg

IRRITATION DATA: (Source: NIOSH RTECS 1992)

Reproductive toxicity (1992 RTECS):

This chemical is a mammalian reproductive toxin.

REPRODUCTIVE TOXICITY DATA (1992 RTECS)

orl-rat TDLo:50 gm/kg (6-15D preg) TXAPA9 81,113,85
SPECIFIC DEVELOPMENTAL ABNORMALITIES

Skin and skin appendages
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Blood and lymphatic systems(including spleen and
marrow)

orl-rat TDLo:8580 mg/kg (6-15D preg) CHYCDW 20,289,86
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

orl-rat TDLo:12500 mg/kg (6-15D preg) TJADAB
29(2),52A,84
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Craniofacial(including nose and tongue)
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

orl-rat TDLo:25 gm/kg (6-15D preg) NTIS** PB85-104594
MATERNAL EFFECTS
Uterus,cervix,vagina
EFFECTS ON FERTILITY
Litter size(# fetuses per litter;measured before
birth)
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)

orl-rat TDLo:50 gm/kg (6-15D preg) NTIS** PB85-104594
EFFECTS ON FERTILITY
Post-implantation mortality

orl-mus TDLo:7500 mg/kg (6-15D preg) TXAPA9 81,113,85
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

orl-mus TDLo:7500 mg/kg (6-15D preg) TJADAB
29(2),52A,84
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Craniofacial(including nose and tongue)
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

orl-mus TDLo:84 gm/kg (1-21D preg/21D post) TOXID9
4,136,84
EFFECTS ON NEWBORN
Live birth index(# fetuses per liter)
EFFECTS ON NEWBORN
Growth statistics(e.g.,reduced weight gain)
EFFECTS ON NEWBORN

Delayed effects

orl-mus TDLo:88720 mg/kg (7-14D preg) EVHPAZ 57,141,84
EFFECTS ON FERTILITY
Post-implantation mortality
EFFECTS ON NEWBORN
Stillbirth
EFFECTS ON NEWBORN
Live birth index(# fetuses per liter)

California Prop 65: Not listed

----- PROTECTION AND FIRST AID -----

PROTECTION SUGGESTED
FROM THE CHRIS MANUAL:

FIRST AID SOURCE: CHRIS Manual 1991
INGESTION: induce vomiting and call a physician.
SKIN AND
EYES: flush with water.

----- INITIAL INCIDENT RESPONSE -----

EXTINGUISHMENT: Water fog, alcohol foam, carbon dioxide, or dry
chemical. Note: Water or foam may cause frothing.
CHRIS91

No DOT Guide information for this compound.

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DOT hazard class: 2.2 NON-FLAMMABLE GAS
DOT guide: 12
Identification number: UN1018
DOT shipping name: CHLORODIFLUOROMETHANE, R22
Packing group:
Label(s) required: NONFLAMMABLE GAS
Special provisions:
Packaging exceptions: 173.306
Non bulk packaging: 173.304
Bulk packaging: 173.314, 315
Quantity limitations-
Passenger air/rail: 75 KG
Cargo aircraft only: 150 KG
Vessel stowage: A
Other stowage provisions:

STCC NUMBER: Not listed

CLEAN WATER ACT Sect.307:No
CLEAN WATER ACT Sect.311:No
CLEAN AIR ACT: Not listed
EPA WASTE NUMBER: None
CERCLA REF: N
RQ DESIGNATION: Not listed
SARA TPQ VALUE: Not listed
SARA Sect. 312
categories:

Chronic toxicity: mutagen.
Chronic toxicity: reproductive toxin.
Fire hazard: flammable.
Sudden pressure: compressed gases.
Chronic toxicity: carcinogen

LISTED IN SARA Sect 313: Yes
de minimus CONCENTRATION: 1.0 percent

UNITED STATES POSTAL SERVICE MAILABILITY:

Hazard class: Compressed gas, nonflammable - Mailable as ORM-D
Mailability: Domestic service and air transportation shipper's declaration
Max per parcel: 27.7 FLUID OZ PER EACH INTERIOR CONTAINER

NFPA CODES:

HEALTH HAZARD (BLUE): Unspecified
FLAMMABILITY (RED) : Unspecified
REACTIVITY (YELLOW): Unspecified
SPECIAL : Unspecified

----- SUMMARY OF REGULATORY LISTS THIS SUBSTANCE APPEARS ON -----

ACGIH TLV list "Threshold Limit Values for 1992-1993"
Canadian Domestic Substances List

Canadian Ingredient Disclosure List. 20/01/88 Canada Gazette part II, Vol 122.
Clean Air Act Section 111 List.
DOT Hazardous Materials Table. 49 CFR 172.101
EPA TSCA 8(a) Preliminary Assessment Information Rule - effective 04/13/89
EPA TSCA 8(d) Health and Safety Data Rule - effective date 04/13/89
EPA TSCA Chemical Inventory List 1989
EPA TSCA Chemical Inventory List 1990
EPA TSCA Chemical Inventory List 1992
EPA TSCA Test Submission (TSCATS) Database - April 1990
EPA TSCA Test Submission (TSCATS) Database - September 1989
MONOCHLORODIFLUOROMETHANE [75-45-6]
Massachusetts Substance List.
New Jersey Right To Know Substance List. (December 1987)
OSHA Air Contaminant (Table Z-1-A). 54 FR 4332, Jan. 19, 1989 and revised.
OSHA Process Safety Rule chemical with a TQ. Effective May 26, 1992
SARA Section 313 Toxic Chemicals List

----- TOXICITY DATA -----

SHORT TERM TOXICITY: Unknown

LONG TERM TOXICITY: unknown

TARGET ORGANS:

SYMPTOMS: Inhalation at greater than 10% concentration in air
may cause narcosis. Liquid may cause frostbite.
Source: CHRIS

CONC IDLH: Nonegiven

NIOSH REL:

ACGIH TLV: TLV = 1000ppm(3540 mg/M3)
ACGIH STEL: Not listed

OSHA PEL: Final Rule Limits:
TWA = 1000 ppm (3500 mg/M3)

MAK INFORMATION: 500 ppm
1800 mG/M3
Substance elicits very weak effect (MAK > 500 ppm):
Peak = 2xMAK for 60 minutes. 3 times per shift of 8
hours.
There is no reason to fear a risk of damage to the
developing embryo or fetus when MAK values are adhered
to.

CARCINOGEN?: N STATUS: See below

CARCINOGEN LISTS:

IARC: Not classified as to human
carcinogenicity or probably not
carcinogenic to humans.

MAK: Not listed
NIOSH: Not listed
NTP: Not listed
ACGIH: Not listed
OSHA: Not listed

LD50 value: No LD50 in RTECS 1992

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1992)

ihl-rat LC50:35 pph/15M
ihl-mus LC50:28 pph/30M
ihl-dog LCLo:70 pph
ihl-gpg LCLo:30 pph/2H

IRRITATION DATA: (Source: NIOSH RTECS 1992)

Reproductive toxicity (1992 RTECS):

This chemical is a mammalian reproductive toxin.

REPRODUCTIVE TOXICITY DATA (1992 RTECS)

ihl-rat TCLo:50000 ppm/5H (56D male) FAATDF 1,266,81
PATERNAL EFFECTS

Prostate, seminal vessel, Cowper's gland, accessory
glands, urethra

California Prop 65: Not listed

----- PROTECTION AND FIRST AID -----

PROTECTION SUGGESTED
FROM THE CHRIS MANUAL:
rubber gloves; goggles.

FIRST AID SOURCE: CHRIS Manual 1991

Remove victim to non-contaminated area and apply artificial respiration
if breathing has stopped. Call a physician immediately. Oxygen inhalation
may be utilized.

FIRST AID SOURCE: DOT Emergency Response Guide 1990.

Stop leak if you can do it without risk. Move victim to fresh air and
call emergency medical care; if not breathing, give artificial
respiration; if breathing is difficult, give oxygen.

----- INITIAL INCIDENT RESPONSE -----

US Department of Transportation Guide to Hazardous Materials Transport

Information - Publication DOT 5800.5 (1990).
DOT SHIPPING NAME: CHLORODIFLUOROMETHANE, R22
DOT ID NUMBER: UN1018

ERG93

GUIDE 12

POTENTIAL HAZARDS

*FIRE OR EXPLOSION

Some of these materials may burn, but none of them ignites readily. Cylinder may explode in heat of fire. *HEALTH HAZARDS Vapors may cause dizziness or suffocation. Contact with liquid may cause frostbite. Fire may produce irritating or poisonous gases.

EMERGENCY ACTION

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection.

*Isolate for 1/2 mile in all directions if tank, rail car or tank truck is involved in fire. CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, CALL CHEMTREC at 1-800-424-9300.

*FIRE

Small Fires: Dry chemical or CO2. Large Fires: Water spray, fog or regular foam. Move container from fire area if you can do it without risk. Apply cooling water to sides of containers that are exposed to flames until well after fire is out. Stay away from ends of tanks. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire. Some of these materials, if filled, may evaporate leaving a flammable residue.

*GAS OR LEAK

Stop leak if you can do it without risk. *FIRST AID Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen.

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CHEMTOX DATA

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----- IDENTIFIERS -----

CHEMTOX RECORD 247
NAME: LEAD
SYNONYMS: C.I. PIGMENT METAL 4; C.I. 77575; KS-4; LEAD FLAKE; LEAD
S2; OLOW (Polish); SI; SO
CAS: 7439-92-1 RTECS: OF7525000
FORMULA: Pb MOL WT: 207.19
WLN: PB
CHEMICAL CLASS: Metal

LAST UPDATE OF THIS RECORD: 06/03/93

See other identifiers listed below under Regulations.

----- PROPERTIES -----

PHYSICAL DESCRIPTION: bluish-grey, soft metal; heavy ductile, soft, gray
solid

BOILING POINT:	2013 K	1739.8 C	3163.7 F
MELTING POINT:	600.6 K	327.4 C	621.4 F

FLASH POINT: Not available

AUTO IGNITION: Not available

VAPOR PRESSURE: 1mm @ 973 C

UEL: ~

LEL: ~

VAPOR DENSITY: No data

SPECIFIC GRAVITY: 11.34

DENSITY: 11.34 g/mL @ 20 C

WATER SOLUBILITY: INSOLUBLE; DISSOLVES SLOWLY IN WATER
CONTAINING A WEAK ACIDINCOMPATIBILITIES: strong ox, hydrogen peroxide, active
metals, sodium, potassium, chlorine
trifluoride, hydrogen peroxide,
zirconium, disodium acetylide, oxidants

REACTIVITY WITH WATER: No data on water reactivity

REACTIVITY WITH COMMON MATERIALS: RELATIVELY IMPENETRABLE TO RADIATION

STABILITY DURING TRANSPORT: No Data

NEUTRALIZING AGENTS: No data

POLYMERIZATION POSSIBILITIES: No data

TOXIC FIRE GASES: WHEN HEATED EMITS HIGHLY TOXIC FUMES;
CAN REACT VIGOROUSLY WITH OXIDIZING
MATERIALS

ODOR DETECTED AT (ppm): Unknown

ODOR DESCRIPTION: No data

100 % ODOR DETECTION: No data

----- REGULATIONS -----

National Primary Ambient Air Quality Standards
1.5 ug/M3 maximum arithmetic mean averaged over a calendar year
National Secondary Ambient Air Quality Standards
as primary standard

DOT hazard class: 6.1 POISON
DOT guide: 53
Identification number: UN2291
DOT shipping name: LEAD COMPOUNDS, SOLUBLE, N.O.S.
Packing group: III
Label(s) required: KEEP AWAY FROM FOOD
Special provisions:
Packaging exceptions: 173.153
Non bulk packaging: 173.213
Bulk packaging: 173.240
Quantity limitations-
Passenger air/rail: 100 KG
Cargo aircraft only: 200 KG
Vessel stowage: A
Other stowage provisions:

STCC NUMBER: Not listed

CLEAN WATER ACT Sect.307:Yes

CLEAN WATER ACT Sect.311:No

National Primary Drinking Water Regulations

Maximum Contaminant Levels (MCL): Treatment technique (12/07/92)

Maximum Contaminant Level Goals (MCLG): 0 mg/L (12/07/92)

CLEAN AIR ACT: CAA '90 By category and CAA '77 Sect 109

HAZARDOUS WASTE NUMBER: D008

CERCLA REF: Y

RQ DESIGNATION: A 10 pounds (4.54 kg) CERCLA

SARA TPQ VALUE: Not listed

SARA Sect. 312
categories:

Chronic toxicity: carcinogen
Chronic toxicity: adverse effect to target organ
after long period of exposure.
Chronic toxicity: mutagen.
Chronic toxicity: reproductive toxin.

LISTED IN SARA Sect 313: Yes
de minimus CONCENTRATION: 1.0 percent

UNITED STATES POSTAL SERVICE MAILABILITY:

Hazard class: ORM-B
Mailability: Domestic service and air transportation; shipper's declaration
Max per parcel: 25 LBS; 5 LBS

NFPA CODES:

HEALTH HAZARD (BLUE): Unspecified

FLAMMABILITY (RED) : Unspecified
REACTIVITY (YELLOW): Unspecified
SPECIAL : Unspecified

----- SUMMARY OF REGULATORY LISTS THIS SUBSTANCE APPEARS ON -----

ACGIH TLV list "Threshold Limit Values for 1992-1993"
California Assembly Bill 2588 Air Toxics "Hot Spots" Chemicals.
California Assembly Bill 1807 Toxic Air Contaminants.
California Proposition 65 Developmental Toxin List
California Proposition 65 Female Reproductive Toxin List
California Proposition 65 Male Reproductive Toxin List
Canadian Domestic Substances List
Canadian Ingredient Disclosure List. 20/01/88 Canada Gazette part II, Vol 122.
Clean Air Act Section 109 National Ambient Air Quality Standards List
Clean Air Act of November 15, 1990. List of pollutants.
Clean Water Act Section 307 Priority Pollutants
DOT Marine Pollutant. Proposed list. 57 FR 3854, Jan 31, 1992
EPA TSCA Chemical Inventory List 1986
EPA TSCA Chemical Inventory List 1989
EPA TSCA Chemical Inventory List 1990
EPA TSCA Chemical Inventory List 1992
EPA TSCA Test Submission (TSCATS) Database - April 1990
EPA TSCA Test Submission (TSCATS) Database - September 1989
LEAD [7439-92-1]
Massachusetts Substance List.
New Jersey DEQ100 list for release reporting.
New Jersey Right To Know Substance List. (December 1987)
New Jersey Right to Know Substance List. Listed as a teratogen.
OSHA Air Contaminant (Table Z-1-A). 54 FR 4332, Jan. 19, 1989 and revised.
OSHA Specifically regulated substance. See 29 CFR 1910.1025
Pennsylvania Hazardous Substance List
RCRA Hazardous Waste
RCRA Toxicity Characteristics (TC) list dated March 29, 1990
SARA Section 313 Toxic Chemicals List

----- TOXICITY DATA -----

SHORT TERM TOXICITY: LASSITUDE, INSOMNIA, PALLOR, EYE GROUND, ANOREXIA,
LOW-WEIGHT, MALNUTRITION, CONSTIPATION, ABDOMINAL
PAIN, COLIC; HYPOTENSE, ANEMIA; GINGIVAL LEAD LINE;
TREMBLING PARALYSIS WRIST. ** Source: 2

LONG TERM TOXICITY: unknown

TARGET ORGANS: gi, CNS, kidneys, blood, gingival tissue

SYMPTOMS: LASS, INSOM, PAL, EYE GROUND, ANOR, LOW-WT, MALNUT,
CONSTI, ABDOM PAIN, COLIC; HYPOTENSE, ANEMIA, GINGIVAL
LEAD LINE; TREM, PARA WRIST. METALLIC TASTE, INCREASED
SALIVATION, PYORRHEA (FLOW OF MUCOUS). NEUROMUSCULAR:
NUMBNESS AND TINGLING OF EXTREMITIES WITH SENSORY

DISTRUBANCE, EXTENSOR WEAKNESS OF WRISTS AND ANKLES, LOSS OF MUSCLE TONE, TREMOR INCREASED DEEP-TENDON REFLEXES, MUSCULAR CRAMPS AND ACHING, MUSCULAR ATROPHY. CNS: VISUAL DISTURBANCES, HEADACHE, NERVOUSNESS OF DEPRESSION, INSOMNIA, MENTAL CONFUSION, DELIRIUM. Source: NIOSHP, THIC

CONC IDLH: 700mg/M3

NIOSH REL: <0.1 mg/M3 Air level to be maintained so that worker blood level remains <0.06 mg/100 g of whole blood

ACGIH TLV: TLV = 0.15mg/M3 as LEAD
ACGIH STEL: Not listed

OSHA PEL: Final Rule Limits:
TWA = See 29 CFR 1910.1025 and 1926.62
50 ug/M3

MAK INFORMATION: 0.1 mg/M3
Substance with systemic effects, onset of effect over 2 hours: Peak = 10xMAK for 30 minutes, once per shift of 8 hours.

CARCINOGEN?: Y STATUS: See below

CARCINOGEN LISTS:

IARC: Carcinogen defined by IARC to be possibly carcinogenic to humans, but having (usually) no human evidence.

MAK: Not listed

NIOSH: Not listed

NTP: Not listed

ACGIH: Animal carcinogen. The chemical is carcinogenic in experimental animals at a relatively high dose, by routes or administration, at sites, or histological types, or by mechanisms that are not considered relevant to worker exposure.

OSHA: Not listed

HUMAN TOXICITY DATA: (Source: NIOSH RTECS)

orl-wmn TDLo:450 mg/kg/6Y JAMAAP 237,2627,77

PERIPHERAL NERVE AND SENSATION

Flaccid paralysis without anesthesia

BEHAVIORAL

Hallucinations, distorted perceptions

BEHAVIORAL

Muscle weakness

LD50 value: No LD50 in RTECS 1992

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1992)

ipr-rat LDLo:1 gm/kg
orl-pgn LDLo:160 mg/kg

IRRITATION DATA: (Source: NIOSH RTECS 1992)

Reproductive toxicity (1992 RTECS):

This chemical is a mammalian reproductive toxin.

REPRODUCTIVE TOXICITY DATA (1992 RTECS)

orl-rat TDLo:790 mg/kg (multigenerations) AEHLAU
23,102,71

EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)
EFFECTS ON EMBRYO OR FETUS
Fetal death

orl-rat TDLo:1140 mg/kg (14D pre-21D post) PHMCAA
20,201,78

EFFECTS ON NEWBORN
Behavioral

orl-rat TDLo:520 mg/kg (7-22D preg/10D post) FEPRA7
37,394,78

EFFECTS ON NEWBORN

orl-rat TDLo:1100 mg/kg (1-22D preg) FEPRA7 37,895,78
SPECIFIC DEVELOPMENTAL ABNORMALITIES

Blood and lymphatic systems(including spleen and
marrow)

EFFECTS ON NEWBORN
Growth statistics(e.g.,reduced weight gain)

ihl-rat TCLo:10 mg/m³/24H (1-21D preg) ZHPMAT
165,294,77

EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Blood and lymphatic systems(including spleen and
marrow)

ihl-rat TCLo:3 mg/m³/24H (1-21D preg) ZHPMAT 165,294,77
EFFECTS ON NEWBORN

orl-mus TDLo:1120 mg/kg (multigenerations) AEHLAU
23,102,71

EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)
EFFECTS ON EMBRYO OR FETUS
Fetal death

orl-mus TDLo:6300 mg/kg (1-21D preg) EXPEAM 31,1312,75
EFFECTS ON FERTILITY
Female fertility index
EFFECTS ON FERTILITY
Pre-implantation mortality

orl-mus TDLo:300 mg/kg (1-2D preg) TXCYAC 6,129,76
EFFECTS ON FERTILITY
Other measures of fertility

orl-mus TDLo:4800 mg/kg (1-16D preg) BECTA6 18,271,77
EFFECTS ON EMBRYO OR FETUS
Cytological changes(including somatic cell genetic material)

orl-dom TDLo:662 mg/kg (1-21W preg) TXAPA9 25,466,73
EFFECTS ON NEWBORN
Behavioral

California Prop 65: Developmental toxin (02/27/87)
Female reproductive toxin (02/27/87)
Male reproductive toxin (02/27/87)
Acceptable intake level-inhalation .5 ugD (01/01/94)
Carcinogen (10/01/92)

----- EPA's IRIS DATA SUMMARY -----
Lead and compounds (inorganic); CASRN 7439-92-1 (04/01/92)

II. CARCINOGENICITY ASSESSMENT FOR LIFETIME EXPOSURE

Substance Name -- Lead and compounds (inorganic)
CASRN -- 7439-92-1
Last Revised -- 05/01/91

Section II provides information on three aspects of the carcinogenic risk assessment for the agent in question; the U.S. EPA classification, and quantitative estimates of risk from oral exposure and from inhalation exposure. The classification reflects a weight-of-evidence judgment of the likelihood that the agent is a human carcinogen. The quantitative risk estimates are presented in three ways. The slope factor is the result of application of a low-dose extrapolation procedure and is presented as the risk per (mg/kg)/day. The unit risk is the quantitative estimate in terms of either risk per ug/L drinking water or risk per ug/cu.m air breathed. The third form in which risk is presented is a drinking water or air concentration providing cancer risks of 1 in 10,000, 1 in 100,000 or 1 in 1,000,000. Background Document 2 (Service Code 5) provides details on the rationale and methods used to derive the carcinogenicity values found in IRIS. Users are referred to Section I for

information on long-term toxic effects other than carcinogenicity.

II.A. EVIDENCE FOR CLASSIFICATION AS TO HUMAN CARCINOGENICITY

II.A.1. WEIGHT-OF-EVIDENCE CLASSIFICATION

Classification -- B2; probable human carcinogen

Basis -- Sufficient animal evidence. Ten rat bioassays and one mouse assay have shown statistically significant increases in renal tumors with dietary and subcutaneous exposure to several soluble lead salts. Animal assays provide reproducible results in several laboratories, in multiple rat strains with some evidence of multiple tumor sites. Short term studies show that lead affects gene expression. Human evidence is inadequate.

II.A.2. HUMAN CARCINOGENICITY DATA

Inadequate. There are four epidemiologic studies of occupational cohorts exposed to lead and lead compounds. Two studies (Dingwall-Fordyce and Lane, 1963; Nelson et al., 1982) did not find any association between exposure and cancer mortality. Selevan et al. (1985), in their retrospective cohort mortality study of primary lead smelter workers, found a slight decrease in the total cancer mortality (SMR=95). Apparent excesses were observed for respiratory cancer (SMR=111, obs=41, $p>0.05$) and kidney cancer (SMR=204, obs=6, $p>0.05$). Cooper and Gaffey (1975) and Cooper (1985 update) performed a cohort mortality study of battery plant workers and lead smelter workers. They found statistically significant excesses for total cancer mortality (SMR=113, obs=344), stomach cancer (SMR=168, obs=34), and lung cancer (SMR=124, obs=109) in the battery plant workers. Although similar excesses were observed in the smelter workers, they were not statistically significant. Cooper and Gaffey (1975) felt it was possible that individual subjects were monitored primarily on the basis of obvious signs of lead exposure, while others who showed no symptoms of lead poisoning were not monitored.

All of the available studies lacked quantitative exposure information, as well as information on the possible contribution from smoking. All studies also included exposures to other metals such as arsenic, cadmium, and zinc for which no adjustment was done. The cancer excesses observed in the lung and stomach were relatively small (<200). There was no consistency of site among the various studies, and no study showed any dose-response relationship. Thus, the available human evidence is considered to be inadequate to refute or demonstrate any potential carcinogenicity for humans from lead exposure.

II.A.3. ANIMAL CARCINOGENICITY DATA

Sufficient. The carcinogenic potential of lead salts (primarily phosphates and acetates) administered via the oral route or by injection has

been demonstrated in rats and mice by more than 10 investigators. The most characteristic cancer response is bilateral renal carcinoma. Rats given lead acetate or subacetate orally have developed gliomas, and lead subacetate also produced lung adenomas in mice after i.p. administration. Most of these investigations found a carcinogenic response only at the highest dose. The lead compounds tested in animals are almost all soluble salts. Metallic lead, lead oxide and lead tetraalkyls have not been tested adequately. Studies of inhalation exposure have not been located in the literature.

Azar et al. (1973) administered 10, 50, 100, and 500 ppm lead as lead acetate in dietary concentrations to 50 rats/sex/group for 2 years. Control rats (100/sex) received the basal laboratory diet. In a second 2-year feeding study, 20 rats/group were given diets containing 0, 1000, and 2000 ppm lead as lead acetate. No renal tumors were reported in the control groups or in treated animals of either sex receiving 10 to 100 ppm. Male rats fed 500, 1000, and 2000 ppm lead acetate had an increased renal tumor incidence of 5/50, 10/20, and 16/20, while 7/20 females in the 2000-ppm group developed renal tumors.

The Azar et al. (1973) study is limited by the lack of experimental detail. The possibility of environmental contamination from lead in the air or drinking water was not mentioned. The strains of rats used were not specified in the study, but the Health Effects Assessment for Lead (U.S. EPA, 1984) indicates the rats were Wistar strain. The weight gain at 1000 and 2000 ppm was reported to be depressed, but details were not given.

Kasprzak et al. (1985), in investigating the interaction of dietary calcium on lead carcinogenicity, fed 1% lead subacetate (8500 ppm Pb) to male Sprague-Dawley rats in the diet for 79 weeks. Of the rats surviving (29/30) in this treatment group beyond 58 weeks, 44.8% had renal tumors. Four rats had adenocarcinomas; the remaining nine had adenomas. Bilateral tumors were noted. No renal tumors were noted among the controls.

As part of a study to determine interactions between sodium nitrite, ethyl urea and lead, male Sprague-Dawley rats were given lead acetate in their drinking water for 76 weeks (Koller et al., 1986). The concentration of lead was 2600 ppm. No kidney tumors were detected among the 10 control rats. Thirteen of 16 (81%) lead-treated rats had renal tubular carcinoma; three tumors were detected at 72 weeks and the remainder detected at the termination of the study.

Van Esch and Kroes (1969) fed basic lead acetate at 0, 0.1%, and 1.0% in the diet to 25 Swiss mice/sex/group for 2 years. No renal tumors developed in the control group, but 6/25 male mice of 0.1% basic lead acetate group had renal tumors (adenomas and carcinomas combined). In the 1.0% group, one female had a renal tumor. The authors thought that the low incidence in the 1.0% group was due to early mortality.

Hamsters given lead subacetate at 0.5% and 1% in the diet had no significant renal tumor response (Van Esch and Kroes, 1969).

___II.A.4. SUPPORTING DATA FOR CARCINOGENICITY

Lead acetate induces cell transformation in Syrian hamster embryo cells (Paolo et al., 1978) and also enhances the incidence of simian adenovirus induction. Lead oxide showed similar enhanced adenovirus induction (Casto et al., 1979).

Under certain conditions lead compounds are capable of inducing chromosomal aberrations in vivo and in tissue cultures. Grandjean et al. (1983) showed a relationship between SCE and lead exposure in exposed workers. Lead has been shown, in a number of DNA structure and function assays, to affect the molecular processes associated with the regulation of gene expression (U.S. EPA, 1986).

___II.B. QUANTITATIVE ESTIMATE OF CARCINOGENIC RISK FROM ORAL EXPOSURE

Not available.

Quantifying lead's cancer risk involves many uncertainties, some of which may be unique to lead. Age, health, nutritional state, body burden, and exposure duration influence the absorption, release, and excretion of lead. In addition, current knowledge of lead pharmacokinetics indicates that an estimate derived by standard procedures would not truly describe the potential risk. Thus, the Carcinogen Assessment Group recommends that a numerical estimate not be used.

___II.C. QUANTITATIVE ESTIMATE OF CARCINOGENIC RISK FROM INHALATION EXPOSURE

Not available.

___II.D. EPA DOCUMENTATION, REVIEW, AND CONTACTS (CARCINOGENICITY ASSESSMENT)

___II.D.1. EPA DOCUMENTATION

U.S. EPA. 1984. Health Effects Assessment for Lead. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH, for the Office of Emergency and Remedial Response, Washington, DC. EPA/540/1-86/055. NTIS PB85-163996/AS.

U.S. EPA. 1986. Air Quality Criteria Document for Lead. Volumes III, IV.

Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Research Triangle Park, NC, for the Office of Air Quality Planning and Standards. EPA-600/8-83/028dF.

U.S. EPA. 1987. Preliminary review of the carcinogenic potential of lead associated with oral exposure. Prepared by the Office of Health and Environmental Assessment, Carcinogenic Assessment Group, Washington DC, for the Office of Drinking Water, Office of Solid Waste and the Office of Emergency and Remedial Response (Superfund). OHEA-C-267. Internal Review Draft.

___ II.D.2. REVIEW (CARCINOGENICITY ASSESSMENT)

The review of the carcinogenic potential of lead associated with oral exposure has received Agency review.

The 1986 Air Quality Criteria Document for Lead has received Agency and External Review.

Agency Work Group Review: 05/04/88

Verification Date: 05/04/88

___ II.D.3. U.S. EPA CONTACTS (CARCINOGENICITY ASSESSMENT)

William Pepelko / ORD -- (202)260-5898 / FTS 260-5898

James Cogliano / ORD -- (202)260-9243 / FTS 260-9243

----- PROTECTION AND FIRST AID -----

PROTECTION SUGGESTED
FROM THE CHRIS MANUAL:

NIOSH POCKET GUIDE TO CHEMICAL HAZARDS:

** WEAR APPROPRIATE EQUIPMENT TO PREVENT:
Repeated or prolonged skin contact.

** WEAR EYE PROTECTION TO PREVENT:
Reasonable probability of eye contact.

** EXPOSED PERSONNEL SHOULD WASH:
At the end of each work shift.

** REMOVE CLOTHING:

Promptly remove non-impervious clothing that becomes contaminated.

** REFERENCE: NIOSH

RECOMMENDED RESPIRATION PROTECTION Source: NIOSH POCKET GUIDE (85-114)
OSHA (LEAD)

Not in excess of 0.5 mg/M3: Half-mask, air-purifying respirator equipped with high efficiency filters.

Not in excess of 2.5 mg/M3: Full facepiece air-purifying respirator equipped with high-efficiency filters.

Not in excess of 50 mg/M3: (1) Any powered, air-purifying respirator with high efficiency filters; or (2) Half-mask supplied-air respirator operated in positive-pressure mode.

Not in excess of 100 mg/M3: Supplied air respirator with full facepiece hood, or helmet or suit and operated in positive pressure mode.

Unknown concentration or Firefighting: Full facepiece, self-contained breathing apparatus operated in positive-pressure mode.

FIRST AID SOURCE: NIOSH

EYE: irr immed

SKIN: soap flush promptly

INHALATION: art resp

INGESTION: water, vomit

FIRST AID SOURCE: DOT Emergency Response Guide 1990.

Move victim to fresh air; call emergency medical care. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Remove and isolate contaminated clothing and shoes at site.

----- INITIAL INCIDENT RESPONSE -----

US Department of Transportation Guide to Hazardous Materials Transport Information - Publication DOT 5800.5 (1990).

DOT SHIPPING NAME: LEAD COMPOUNDS, SOLUBLE, N.O.S.

DOT ID NUMBER: UN2291

ERG93

GUIDE 53

POTENTIAL HAZARDS

*HEALTH HAZARDS

Poisonous if swallowed.

Inhalation of dust or mist may be poisonous.

Fire may produce irritating or poisonous gases.

Runoff from fire control or dilution water may cause pollution.

*FIRE OR EXPLOSION

Some of these materials may burn, but none of them ignites readily.

EMERGENCY ACTION

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection. CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, CALL CHEMTREC AT 1-800-424-9300. If water

pollution occurs, notify the appropriate authorities.

***FIRE**

Small Fires: Dry chemical, CO2, water spray or regular foam.

Large Fires: Water spray, fog or regular foam.

Move container from fire area if you can do it without risk.

***SPILL OR LEAK**

Do not touch or walk through spilled material; stop leak if you can do it without risk.

Small Spills: Take up with sand or other noncombustible absorbent material and place into containers for later disposal.

Small Dry Spills: With clean shovel place material into clean, dry container and cover loosely; move containers from spill area.

Large Spills: Dike far ahead of liquid spill for later disposal.

***FIRST AID**

Move victim to fresh air; call emergency medical care. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Remove and isolate contaminated clothing and shoes at the site.

DISCLAIMER: The data shown above on this chemical represents a best effort on the part of the compilers of the CHEMTOX database to obtain useful, accurate, and factual data. The use of these data shall be in accordance with the guidelines and limitations of the user's CHEMTOX license agreement. The COMPILERS of the CHEMTOX database shall not be held liable for inaccuracies or omissions within this database, or in any of its printed or displayed output forms.

CHEMTOX DATA

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----- IDENTIFIERS -----

CHEMTOX RECORD 1642 LAST UPDATE OF THIS RECORD: 06/03/93
 NAME: METHYL CHLOROFORM
 SYNONYMS: AEROTHENE TT; CHLOROETENE; CHLOROETHENE; CHLOROETHENE NU;
 CHLOROFORM, METHYL-; CHLOROTHANE NU; CHLOROTHENE;
 CHLOROTHENE(Inhibited); CHLOROTHENE NU; CHLOROTHENE VG;
 CHLORTEN; INHIBISOL; METHYLCHLOROFORM; METHYL CHLOROFORM
 (DOT); METHYLTRICHLOROMETHANE; NCI-C04626; SOLVENT 111;
 alpha-T; 1,1,1-TRICHLOROETHAAN (Dutch);
 1,1,1-TRICHLORAETHAN (German); TRICHLORO-1,1,1-ETHANE
 (French); alpha-TRICHLOROETHANE; 1,1,1-TRICHLOROETHANE;
 1,1,1-TRICHLOROETANO (Italian); ETHANE, 1,1,1-TRICHLORO-;
 1,1,1-TRICHLOROETHANE, STABILIZED
 CAS: 71-55-6 RTECS: KJ2975000
 FORMULA: C2H3Cl3 MOL WT: 133.40
 WLN: GXGG1
 CHEMICAL CLASS:Halogenated h-carbon

See other identifiers listed below under Regulations.

----- PROPERTIES -----

PHYSICAL DESCRIPTION: colorless liquid with a mild, chloroform-like odor
 BOILING POINT: 346.31 K 73.1 C 163.6 F
 MELTING POINT: 235.76 K -37.4 C -35.4 F
 FLASH POINT: Not available
 AUTO IGNITION: 809.81 K 536.6 C 998 F
 VAPOR PRESSURE: 100 mm @ 20.0
 UEL: 16 %
 LEL: 7 %
 VAPOR DENSITY: 4.63 (air=1)
 EVAPORATION RATE: 6.00(n-BUTYL ACETATE=1)
 SPECIFIC GRAVITY: 1.3492 @ 20
 DENSITY: 1.3376 g/mL @ 20 C
 WATER SOLUBILITY: 0.07 %
 INCOMPATIBILITIES: strong caustics, strong oxidizers,
 chemically active metals, such as
 aluminum, magnesium powders, sodium,
 potassium
 REACTIVITY WITH WATER: No data on water reactivity
 REACTIVITY WITH COMMON MATERIALS: READILY CORRODES ALUMINUM AND ALUMINUM
 ALLOYS. Source: THIC
 STABILITY DURING TRANSPORT: No Data
 NEUTRALIZING AGENTS: No data
 POLYMERIZATION POSSIBILITIES: No data
 TOXIC FIRE GASES: HIGHLY TOXIC, ARE IRRITATING FUMES

ODOR DETECTED AT (ppm): 100 ppm
ODOR DESCRIPTION: Chloroform-like; sweetish Source:CHRIS
100 % ODOR DETECTION: No data

----- REGULATIONS -----

DOT hazard class: 6.1 POISON
DOT guide: 74
Identification number: UN2831
DOT shipping name: 1,1,1-Trichloroethane
Packing group: III
Label(s) required: KEEP AWAY FROM FOOD
Special provisions: N36,T7
Packaging exceptions: 173.153
Non bulk packaging: 173.203
Bulk packaging: 173.241
Quantity limitations-
Passenger air/rail: 60 L
Cargo aircraft only: 220 L
Vessel stowage: A
Other stowage provisions:40,M2

STCC NUMBER: Not listed

CLEAN WATER ACT Sect.307:Yes

CLEAN WATER ACT Sect.311:No

National Primary Drinking Water Regulations

Maximum Contaminant Levels (MCL): 0.2 mg/L (01/09/89)

Maximum Contaminant Level Goals (MCLG): 0.2 mg/L (01/09/89)

CLEAN AIR ACT: CAA '90 Listed

EPA WASTE NUMBER: U226

CERCLA REF: Not listed

RQ DESIGNATION: C 1000 pounds (454 kg) CERCLA

SARA TPQ VALUE: Not listed

SARA Sect. 312
categories:

Acute toxicity: Irritant

Acute toxicity: adverse effect to target organs.

Chronic toxicity: adverse effect to target organ
after long period of exposure.

Chronic toxicity: mutagen.

Chronic toxicity: reproductive toxin.

Chronic toxicity: carcinogen

LISTED IN SARA Sect 313: Yes

de minimus CONCENTRATION: 1.0 percent

UNITED STATES POSTAL SERVICE MAILABILITY:

Hazard class: ORM-A

Mailability: Domestic service and air transportation; shipper's declaration

Max per parcel: 10 GAL; 1 PT

NFPA CODES:

HEALTH HAZARD (BLUE): (3) Extremely hazardous to health. Full protection required. No skin surface should be exposed.
FLAMMABILITY (RED) : (1) This material must be preheated before ignition can occur.
REACTIVITY (YELLOW): (1) Normally stable, but may become unstable at elevated temperature and pressures.
SPECIAL : Unspecified

----- SUMMARY OF REGULATORY LISTS THIS SUBSTANCE APPEARS ON -----

ACGIH TLV list "Threshold Limit Values for 1992-1993"
California Assembly Bill 1803 Well Monitoring Chemicals.
California Assembly Bill 2588 Air Toxics "Hot Spots" Chemicals.
Canadian Domestic Substances List
Canadian Ingredient Disclosure List. 20/01/88 Canada Gazette part II, Vol 122.
Clean Air Act Section 111 List.
Clean Air Act of November 15, 1990. List of pollutants.
Clean Water Act Section 307 Priority Pollutants
DOT Hazardous Materials Table. 49 CFR 172.101
EPA Carcinogen Assessment Group List
EPA List of VOC chemicals from 40 CFR 60.489
EPA TSCA 8(a) Preliminary Assessment Information Rule - effective 11/19/82
EPA TSCA 8(d) Health and Safety Data Rule - effective date 10/04/82
EPA TSCA Chemical Inventory List 1986
EPA TSCA Chemical Inventory List 1989
EPA TSCA Chemical Inventory List 1990
EPA TSCA Chemical Inventory List 1992
EPA TSCA Section 12(b) Export Rule Notification.
EPA TSCA Test Submission (TSCATS) Database - April 1990
EPA TSCA Test Submission (TSCATS) Database - September 1989
First Third Wastes List. 40 CFR 268.10. 54 FR 26594 (June 23, 1989)
METHYL CHLOROFORM [71-55-6]
Massachusetts Substance List.
New Jersey DEQ100 list for release reporting.
New Jersey Right To Know Substance List. (December 1987)
OSHA Air Contaminant (Table Z-1-A). 54 FR 4332, Jan. 19, 1989 and revised.
Pennsylvania Hazardous Substance List
RCRA Hazardous Constituents for Ground Water Monitoring. Ap'dx IX to 40 CFR 264
RCRA Hazardous Waste
SARA Section 110 Priority List of CERCLA Hazardous Substances
SARA Section 313 Toxic Chemicals List
Superfund/CERCLA RQ list. Table 302.4 in 54 FR 50968 (December 11, 1989)
Washington State Discarded Chemical Products List, November 17, 1989

----- TOXICITY DATA -----

SHORT TERM TOXICITY: INHALATION: levels above 900 ppm can cause dizziness, mental confusion, drowsiness, loss of coordination and unconsciousness. death may result. SKIN: can cause irritation and rash. absorption is moderate; may contribute significantly to health hazard. Eyes: has

caused irritation at levels of 450 ppm. INGESTION: may cause symptoms similar to inhalation. in addition, may cause mouth, throat and stomach irritation. (NYDH)

LONG TERM TOXICITY: repeated or prolonged contact at levels of 450 ppm or above may result in irritation and dry, scaly, fractured skin . dizziness, mental confusion, slowed response time and generally reversible liver and kidney damage may result from prolonged inhalation. (NYDH)

TARGET ORGANS: skin,cvs,CNS,eyes

SYMPTOMS: INHALATION: symptoms range from loss of equilibrium and incoordination to loss of consciousness; high concentration can be fatal due to simple asphyxiation combined with loss of consciousness. INGESTION: produces effects similar to inhalation and may cause some feeling of nausea. EYES: slightly irritating and lachrymatory. SKIN: defatting action may cause dermatitis. Source: CHRIS

CONC IDLH: 1000PPM

NIOSH REL: 350 ppm Ceiling exposures which shall at no time be exceeded 1900 mg/M3 Ceiling exposures which shall at no time be exceeded

TLV TLV: TLV = 350ppm(1,910 mg/M3)
STEL STEL: STEL = 450 ppm(2,460 mg/M3)

OSHA PEL: Transitional Limits:
PEL = 350 ppm(1900mg/M3)
Final Rule Limits:
TWA = 350 ppm (1900 mg/M3)
STEL = 450 ppm(2450 mg/M3)

MAK INFORMATION: 200 ppm
1080 mG/M3
Substance with systemic effects, onset of effect less than or equal to 2 hrs: Peak = 5xMAK for 30 minutes, 2 times per shift of 8 hours.
There is no reason to fear a risk of damage to the developing embryo or fetus when MAK values are adhered to.

CARCINOGEN?: N STATUS: See below

CARCINOGEN LISTS: IARC: Not classified as to human carcinogenicity or probably not carcinogenic to humans.

MAK: Not listed
NIOSH: Not listed
NTP: Not listed
ACGIH: Not listed
OSHA: Not listed

HUMAN TOXICITY DATA: (Source: NIOSH RTECS)

ihl-man TCLo:350 ppm WEHRBJ 10,82,73
BEHAVIORAL
Hallucinations, distorted perceptions
BEHAVIORAL
Changes in motor activity(specific assay)
BEHAVIORAL
Change in psychophysiological tests

orl-hmn TDLo:670 mg/kg NTIS** PB257-185

GASTROINTESTINAL
Hypermotility, diarrhea
GASTROINTESTINAL
Nausea or vomiting
GASTROINTESTINAL
Other changes

ihl-hmn TCLo:920 ppm/70M AIHAAP 19,353,58

BEHAVIORAL
Changes in motor activity(specific assay)
SENSE ORGANS
Eye
Conjunctive irritation

LD50 value: orl-rat LD50:9600 mg/ kg

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1992)

orl-rat LD50:9600 mg/kg
ihl-rat LC50:18000 ppm/4H
ipr-rat LD50:3593 mg/kg
orl-mus LD50:6 gm/kg
ihl-mus LC50:3911 ppm/2H
ipr-mus LD50:3636 mg/kg
scu-mus LD50:16 gm/kg
orl-dog LD50:750 mg/kg
ipr-dog LD50:3100 mg/kg
ivn-dog LDLo:95 mg/kg
ihl-cat LC50:24400 mg/m3
orl-rbt LD50:5660 mg/kg
skn-rbt LD50:>20 gm/kg
scu-rbt LDLo:500 mg/kg
orl-gpg LD50:9470 mg/kg

IRRITATION DATA: (Source: NIOSH RTECS 1992)

eye-man 450 ppm/8H

skn-rbt 5 gm/12D-I MLD
skn-rbt 500 mg/24H MOD
eye-rbt 100 mg MLD
eye-rbt 2 mg/24H SEV

Reproductive toxicity (1992 RTECS):

This chemical is a mammalian reproductive toxin.

REPRODUCTIVE TOXICITY DATA (1992 RTECS)

orl-rat TDLo:43 mg/kg (1-22D preg/21D post) TJADAB
29(2),25A,84

SPECIFIC DEVELOPMENTAL ABNORMALITIES

Cardiovascular(circulatory)system

California Prop 65: Not listed

----- EPA's IRIS DATA SUMMARY -----

1,1,1-Trichloroethane; CASRN 71-55-6 (04/01/92)

_II. CARCINOGENICITY ASSESSMENT FOR LIFETIME EXPOSURE

Substance Name -- 1,1,1-Trichloroethane

CASRN -- 71-55-6

Last Revised -- 09/01/90

Section II provides information on three aspects of the carcinogenic risk assessment for the agent in question; the U.S. EPA classification, and quantitative estimates of risk from oral exposure and from inhalation exposure. The classification reflects a weight-of-evidence judgment of the likelihood that the agent is a human carcinogen. The quantitative risk estimates are presented in three ways. The slope factor is the result of application of a low-dose extrapolation procedure and is presented as the risk per (mg/kg)/day. The unit risk is the quantitative estimate in terms of either risk per ug/L drinking water or risk per ug/cu.m air breathed. The third form in which risk is presented is a drinking water or air concentration providing cancer risks of 1 in 10,000, 1 in 100,000 or 1 in 1,000,000. Background Document 2 (Service Code 5) provides details on the rationale and methods used to derive the carcinogenicity values found in IRIS. Users are referred to Section I for information on long-term toxic effects other than carcinogenicity.

_II.A. EVIDENCE FOR CLASSIFICATION AS TO HUMAN CARCINOGENICITY

_II.A.1. WEIGHT-OF-EVIDENCE CLASSIFICATION

Classification -- D; not classifiable as to human carcinogenicity.

Basis -- There are no reported human data and animal studies (one lifetime gavage, one intermediate-term inhalation) have not demonstrated carcinogenicity. Technical grade 1,1,1-trichloroethane has been shown to be weakly mutagenic, although the contaminant, 1,4-dioxane, a known animal carcinogen, may be responsible for this response.

II.A.2. HUMAN CARCINOGENICITY DATA

None.

II.A.3. ANIMAL CARCINOGENICITY DATA

Inadequate. The NCI (1977) treated Osborne-Mendel rats (50/sex/dose) with 750 or 1500 mg/kg technical-grade 1,1,1-trichloroethane 5 times/week for 78 weeks by gavage. The rats were observed for an additional 32 weeks. Twenty rats of each sex served as untreated controls. Low survival of both male and female treated rats (3%) may have precluded detection of a significant number of tumors late in life. Although a variety of neoplasms was observed in both treated and matched control rats, they were common to aged rats and were not dose-related. Similar results were obtained when the NCI (1977) treated B6C3F1 hybrid mice with the time-weighted average doses of 2807 or 5615 mg/kg 1,1,1-trichloroethane by gavage 5 days/week for 78 weeks. The mice were observed for an additional 12 weeks. The control and treated groups had 20 and 50 animals of each sex, respectively. Only 25 to 45% of those treated survived until the time of terminal sacrifice. A variety of neoplasms were observed in treated groups, but the incidence not statistically different from matched controls.

Quast et al. (1978) exposed 96 Sprague-Dawley rats of both sexes to 875 1750 ppm 1,1,1-trichloroethane vapor for 6 hours/day, 5 days/week for 12 months, followed by an additional 19-month observation period. The only significant sign of toxicity was an increased incidence of focal hepatocellular alterations in female rats at the highest dosage. It was not evident that a maximum tolerated dose (MTD) was used nor was a range-finding study conducted. No significant dose-related neoplasms were reported, but these dose levels were below those used in the NCI study.

II.A.4. SUPPORTING DATA FOR CARCINOGENICITY

Mutagenicity testing of 1,1,1-trichloroethane has produced positive results in *S. typhimurium* strain TA100 (Simmon et al., 1977; Fishbein, 1979; Snow et al., 1979) as well as some negative results (Henschler et al., 1977; Taylor, 1978).

It was mutagenic for *S. typhimurium* strain TA1535 both with exogenous metabolic activation (Farber, 1977) and without activation (Nestmann et al., 1980). 1,1,1-Trichloroethane did not result in gene conversion or mitotic recombination in *Saccharomyces cerevisiae* (Farber, 1977; Simmon et al., 1977) nor was it positive in a host-mediated forward mutation assay using *Schizosaccharomyces pombe* in mice. The chemical also failed to produce chromosomal aberrations in the bone marrow of cats (Rampy et al., 1977), but responded positively in a cell transformation test with rat embryo cells

(Price et al., 1978).

An isomer, 1,1,2-trichloroethane, is carcinogenic in mice, inducing liver cancer and pheochromocytomas in both sexes. Dichloroethanes, tetrachloroethanes and hexachloroethanes also produced liver cancer in mice and other types of neoplasms in rats.

It should be noted that 1,4-dioxane, a known animal carcinogen that causes liver and nasal tumors in more than one strain of rats and hepatocellular carcinomas in mice, is a contaminant of technical-grade 1,1,1-trichloroethane.

__ II.B. QUANTITATIVE ESTIMATE OF CARCINOGENIC RISK FROM ORAL EXPOSURE

Not available.

__ II.C. QUANTITATIVE ESTIMATE OF CARCINOGENIC RISK FROM INHALATION EXPOSURE

Not available.

__ II.D. EPA DOCUMENTATION, REVIEW, AND CONTACTS (CARCINOGENICITY ASSESSMENT)

__ II.D.1. EPA DOCUMENTATION

U.S. EPA. 1984a. Health Effects Assessment for 1,1,1-Trichloroethane. Prepared by the Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH for the Office of Emergency and Remedial Response, Washington, DC.

U.S. EPA. 1984b. Health Assessment Document for 1,1,1-Trichloroethane. Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Research Triangle Park, NC. EPA-600/8-82-003F.

__ II.D.2. REVIEW (CARCINOGENICITY ASSESSMENT)

The 1984 Health Effects Assessment for 1,1,1-Trichloroethane has received limited Agency review. The values in the 1984 Health Assessment Document for 1,1,1-Trichloroethane have received both Agency and public review.

Agency Work Group Review: 08/05/87

Verification Date: 08/05/87

___ II.D.3. U.S. EPA CONTACTS (CARCINOGENICITY ASSESSMENT)

Charlingayya Hiremath / ORD -- (202)260-5898 / FTS 260-5898

----- PROTECTION AND FIRST AID -----

PROTECTION SUGGESTED
FROM THE CHRIS MANUAL:

NIOSH POCKET GUIDE TO CHEMICAL HAZARDS:

** WEAR APPROPRIATE EQUIPMENT TO PREVENT:
Repeated or prolonged skin contact.

** WEAR EYE PROTECTION TO PREVENT:
Reasonable probability of eye contact.

EXPOSED PERSONNEL SHOULD WASH:
Promptly when skin becomes contaminated.

** REMOVE CLOTHING:
Promptly remove non-impervious clothing that becomes wet.

** REFERENCE: NIOSH

FIRST AID SOURCE: NIOSH

EYE: irr immed

SKIN: soap wash promptly

INHALATION: art resp

INGESTION: ipecac, vomit

FIRST AID SOURCE: CHRIS Manual 1991

Get medical attention for all eye exposures and any other serious over-exposures. Do NOT administer adrenalin or epinephrine; otherwise, treatment is symptomatic.

INHALATION: remove victim to fresh air; if necessary, apply artificial respiration and/or administer oxygen.

INGESTION: have victim drink water and induce vomiting.

EYES: flush thoroughly with water.

SKIN: remove contaminated clothing and wash exposed area thoroughly with

soap and warm water.

FIRST AID SOURCE: DOT Emergency Response Guide 1990.

Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen. In case of contact with material, immediately flush eyes with running water for at least 15 minutes. Wash skin with soap and water. Remove and isolate contaminated clothing and shoes at the site. Use first aid treatment according to the nature of the injury.

----- INITIAL INCIDENT RESPONSE -----

FIRE EXTINGUISHMENT: Dry chemical, foam, or carbon dioxide. CHRIS91

US Department of Transportation Guide to Hazardous Materials Transport Information - Publication DOT 5800.5 (1990).

DOT SHIPPING NAME: 1,1,1-Trichloroethane

DOT ID NUMBER: UN2831

ERG93

GUIDE 74

POTENTIAL HAZARDS

*HEALTH HAZARDS

Vapors may cause dizziness or suffocation.
Exposure in an enclosed area may be very harmful.
Contact may irritate or burn skin and eyes.
Fire may produce irritating or poisonous gases.
Runoff from fire control or dilution water may cause pollution.

*FIRE OR EXPLOSION

None of these materials may burn, but none of them ignites readily.
Vapors are heavier than air.
*Air/vapor mixtures may explode when ignited.
Container may explode in heat of fire.

EMERGENCY ACTION

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind, out of low areas, and ventilate closed spaces before entering. Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection. *Isolate for 1/2 mile in all directions if tank, rail car or tank truck is involved in fire. Remove and isolate contaminated clothing at the site. CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, CALL CHEMTREC AT 1-800-424-9300. If water pollution occurs, notify the appropriate authorities.

*FIRE

Small Fires: Dry chemical or CO2.
Large Fires: Water spray, fog or regular foam.
Apply cooling water to sides of containers that are exposed to flames until well after fire is out. Stay away from ends of tanks.

*SPILL OR LEAK

Shut off ignition sources; no flares, smoking or flames in hazard area. Stop leak if you can do it without risk.
Small Liquid Spills: Take up with sand, earth or other noncombustible absorbent material.

Large Spills: Dike far ahead of liquid spill for later disposal.

*FIRST AID

Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen. In case of contact with material, immediately flush eyes with running water for at least 15 minutes. Wash skin with soap and water. Remove and isolate contaminated clothing and shoes at the site. Use first aid treatment according to the nature of the injury.

DISCLAIMER: The data shown above on this chemical represents a best effort on the part of the compilers of the CHEMTOX database to obtain useful, accurate, and factual data. The use of these data shall be in accordance with the guidelines and limitations of the user's CHEMTOX license agreement. The COMPILERS of the CHEMTOX database shall not be held liable for inaccuracies or omissions within this database, or in any of its printed or displayed output forms.

ODOR DESCRIPTION: nonresidual Source:CHRIS
100 % ODOR DETECTION: No data

----- REGULATIONS -----

DOT hazard class: 3 FLAMMABLE LIQUID
DOT guide: 26
Identification number: UN1219
DOT shipping name: Isopropanol [or] isopropyl alcohol
Packing group: II
Label(s) required: FLAMMABLE LIQUID
Special provisions: T1
Packaging exceptions: 173.150
Non bulk packaging: 173.202
Bulk packaging: 173.242
Quantity limitations-
Passenger air/rail: 5 L
Cargo aircraft only: 60 L
Vessel stowage: B
Other stowage provisions:

STCC NUMBER: 4909205

CLEAN WATER ACT Sect.307:No
CLEAN WATER ACT Sect.311:No
CLEAN AIR ACT: Not listed
EPA WASTE NUMBER: D001
CERCLA REF: N
DESIGNATION: Not listed
SARA TPQ VALUE: Not listed
SARA Sect. 312
categories:

Acute toxicity: Irritant
Acute toxicity: adverse effect to target organs.
Chronic toxicity: mutagen.
Chronic toxicity: reproductive toxin.
Fire hazard: flammable.
Chronic toxicity: carcinogen

LISTED IN SARA Sect 313: Yes
de minimus CONCENTRATION: 0.1 percent

UNITED STATES POSTAL SERVICE MAILABILITY:
Hazard class: Flammable liquid - Mailable as ORM-D
Mailability: Domestic surface mail only
Max per parcel: 1 QT METAL; 1 PT OTHER

NFPA CODES:

HEALTH HAZARD (BLUE): (1) Slightly hazardous to health. As a precaution wear self-contained breathing apparatus.
FLAMMABILITY (RED) : (3) This material can be ignited under almost all temperature conditions.

REACTIVITY (YELLOW): (0) Stable even under fire conditions.
SPECIAL : Unspecified

----- SUMMARY OF REGULATORY LISTS THIS SUBSTANCE APPEARS ON -----

ACGIH TLV list "Threshold Limit Values for 1992-1993"
Canadian Domestic Substances List
Canadian Ingredient Disclosure List. 20/01/88 Canada Gazette part II, Vol 122.
Clean Air Act Section 111 List.
Clean Air Act Section 112 Hazardous Air Pollutants List.
DOT Hazardous Materials Table. 49 CFR 172.101
EPA List of VOC chemicals from 40 CFR 60.489
EPA TSCA 8(a) Preliminary Assessment Information Rule - effective 02/12/87
EPA TSCA 8(d) Health and Safety Data Rule - effective date 12/15/86
EPA TSCA Chemical Inventory List 1986
EPA TSCA Chemical Inventory List 1989
EPA TSCA Chemical Inventory List 1990
EPA TSCA Chemical Inventory List 1992
EPA TSCA Section 12(b) Export Rule Notification.
EPA TSCA Test Submission (TSCATS) Database - April 1990
EPA TSCA Test Submission (TSCATS) Database - September 1989
ISOPROPYL ALCOHOL [67-63-0]
Massachusetts Substance List.
National Toxicology Program (NTP) list of human carcinogens
New Jersey Right To Know Substance List. (December 1987)
OSHA Air Contaminant (Table Z-1-A). 54 FR 4332, Jan. 19, 1989 and revised.
OSHA Process Safety Rule chemical with a TQ. Effective May 26, 1992
RCRA Hazardous Waste
RCRA Section 313 Toxic Chemicals List
TSCA Chemical Hazard Information Profile (CHIP) available - dated 11/20/79
TSCA Chemical Hazard Information Profile (CHIP) available - dated 12/29/77

----- TOXICITY DATA -----

SHORT TERM TOXICITY: INHALATION: irritation of the nose and throat may occur at 400 ppm and above. SKIN: 5% solution may cause irritation and dryness. Eyes: vapor levels of 20 ppm or above may result in irritation. liquid may cause corneal burns and eye damage. INGESTION: 22.5 ml (2/3 oz.) has caused salivation, reddening of face, stomach pain, depression, dizziness, headache, vomiting and unconsciousness. ingestion of 100 ml (3 oz.) has caused death. (NYDH)

LONG TERM TOXICITY: no reported long term exposure effects. (NYDH)

TARGET ORGANS: eyes, skin, resp sys

SYMPTOMS: Vapors cause mild irritation of eyes and upper respiratory tract; high concentrations may be anesthetic. Liquid irritates eyes and may cause injury; harmless to skin; if ingested causes

drunkenness and vomiting. Source: CHRIS

CONC IDLH: 12000ppm

NIOSH REL: 400 ppm Time weighted averages for 8-hour exposure
984 mg/M3 Time weighted averages for 8-hour exposure
800 ppm Ceiling exposures which shall at no time be
exceeded 1968 mg/M3 Ceiling exposures which shall at
no time be exceeded

ACGIH TLV: TLV = 400ppm(983 mg/M3)
ACGIH STEL: STEL = 500 ppm(1,230 mg/M3)

OSHA PEL: Transitional Limits:
PEL = 400 ppm(980mg/M3)
Final Rule Limits:
TWA = 400 ppm (980 mg/M3)
STEL = 500 ppm(1225 mg/M3)

MAK INFORMATION: 400 ppm
980 mg/M3
Substance with systemic effects, onset of effect less
than or equal to 2 hrs: Peak = 2xMAK for 30 minutes, 4
times per shift of 8 hours.

CARCINOGEN?: N STATUS: See below

REFERENCES: HUMAN SUSPECTED IARC** 15,223,77
ANIMAL INDEFINITE IARC** 15,223,77

CARCINOGEN LISTS: IARC: Not classified as to human
carcinogenicity or probably not
carcinogenic to humans.
MAK: Not listed
NIOSH: Not listed
NTP: Not listed
ACGIH: Not listed
OSHA: Not listed

HUMAN TOXICITY DATA: (Source: NIOSH RTECS)
orl-man TDLo:14432 mg/kg NEJMAG 277,699,67
BEHAVIORAL
Coma
VASCULAR
BP lowering not characterized in autonomic section
LUNGS, THORAX, OR RESPIRATION
Dyspnea
orl-hmn TDLo:223 mg/kg JLCMAK 12,326,27
BEHAVIORAL
Hallucinations, distorted perceptions

CARDIAC

Pulse rate decreased with fall in BP

VASCULAR

BP lowering not characterized in autonomic section

orl-man LDLo:5272 mg/kg AJCPAI 38,144,62

BEHAVIORAL

Coma

VASCULAR

BP lowering not characterized in autonomic section

LUNGS, THORAX, OR RESPIRATION

Chronic pulmonary edema or congestion

orl-hmn LDLo:3570 mg/kg 34ZIAG -,339,69

BEHAVIORAL

Coma

LUNGS, THORAX, OR RESPIRATION

Respiratory depression

GASTROINTESTINAL

Nausea or vomiting

LD50 value: orl-rat LD50:5045 mg/ kg

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1992)

orl-rat LD50:5045 mg/kg
ihl-rat LCLo:16000 ppm/4H
ipr-rat LD50:2735 mg/kg
ivn-rat LD50:1088 mg/kg
orl-mus LD50:3600 mg/kg
ihl-mus LCLo:12800 ppm/3H
ipr-mus LD50:4477 mg/kg
scu-mus LDLo:6 gm/kg
ivn-mus LD50:1509 mg/kg
orl-dog LDLo:1537 mg/kg
ivn-dog LDLo:1024 mg/kg
ivn-cat LDLo:1963 mg/kg
orl-rbt LD50:6410 mg/kg
skn-rbt LD50:12800 mg/kg
ipr-rbt LD50:667 mg/kg
ivn-rbt LD50:1184 mg/kg
ipr-gpg LD50:2560 mg/kg
ipr-ham LD50:3444 mg/kg
par-frg LDLo:20 gm/kg
scu-mam LDLo:6 gm/kg

IRRITATION DATA: (Source: NIOSH RTECS 1992)

Reproductive toxicity (1992 RTECS):

This chemical is a mammalian reproductive toxin.

REPRODUCTIVE TOXICITY DATA (1992 RTECS)

orl-rat TDLo:11340 mg/kg (45D pre) GISAAA 43(1),8,78

MATERNAL EFFECTS

Menstrual cycle changes or disorders

orl-rat TDLo:5040 mg/kg (1-20D preg) GISAAA 43(1),8,78

EFFECTS ON FERTILITY

Litter size(# fetuses per litter;measured before birth)

orl-rat TDLo:20160 mg/kg (1-20D preg) GISAAA 43(1),8,78

EFFECTS ON FERTILITY

Pre-implantation mortality

orl-rat TDLo:32400 ug/kg (26W pre) GISAAA 43(1),8,78

EFFECTS ON EMBRYO OR FETUS

Fetal death

orl-rat TDLo:6480 mg/kg (26W male/26W pre) GISAAA 43(1),8,78

EFFECTS ON NEWBORN

Growth statistics(e.g.,reduced weight gain)

ihl-rat TCLo:3500 ppm/7H (1-19D preg) FCTOD7 26,247,88

EFFECTS ON EMBRYO OR FETUS

Fetotoxicity(except death,e.g.,stunted fetus)

ihl-rat TCLo:10000 ppm/7H (1-19D preg) FCTOD7 26,247,88

EFFECTS ON FERTILITY

Pre-implantation mortality

EFFECTS ON FERTILITY

Post-implantation mortality

EFFECTS ON EMBRYO OR FETUS

Fetal death

California Prop 65: Not listed

----- PROTECTION AND FIRST AID -----

PROTECTION SUGGESTED

FROM THE CHRIS MANUAL:

organic vapor canister or air-supplied mask; chemical goggles or face splash shield.

NIOSH POCKET GUIDE TO CHEMICAL HAZARDS:

** WEAR APPROPRIATE EQUIPMENT TO PREVENT:

Repeated or prolonged skin contact.

** WEAR EYE PROTECTION TO PREVENT:

Reasonable probability of eye contact.

** EXPOSED PERSONNEL SHOULD WASH:

Promptly when skin becomes wet.

**** REMOVE CLOTHING:**

Immediately remove any clothing that becomes wet to avoid any flammability

**** REFERENCE: NIOSH**

RECOMMENDED RESPIRATION PROTECTION Source: NIOSH POCKET GUIDE (85-114)
NIOSH (ISOPROPYL ALCOHOL)

1000 ppm: Any powered air-purifying respirator with organic vapor cartridge(s). * Substance causes eye irritation or damage; eye protection needed. / Any chemical cartridge respirator with a full facepiece and organic vapor cartridge(s).

10000 ppm: Any supplied-air respirator operated in a continuous flow mode. * Substance causes eye irritation or damage; eye protection needed.

20000 ppm: Any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister. / Any self-contained breathing apparatus with a full facepiece. / Any supplied-air respirator with a full facepiece.

EMERGENCY OR PLANNED ENTRY IN UNKNOWN CONCENTRATIONS OR IDLH CONDITIONS.: Any self-contained breathing apparatus with full facepiece and operated in a pressure-demand or other positive pressure mode. / Any supplied-air respirator with a full facepiece and operated in pressure-demand or other positive pressure mode in combination with an auxiliary self-contained breathing apparatus operated in pressure-demand or other positive pressure mode.

ESCAPE: Any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister. / Any appropriate escape-type self-contained breathing apparatus.

FIRST AID SOURCE: CHRIS Manual 1991

INHALATION: if victim is overcome by vapors, remove from exposure immediately; call a physician; if breathing is irregular or has stopped, start resuscitation and administer oxygen.

EYES: flush with water for at least 15 min.

FIRST AID SOURCE: DOT Emergency Response Guide 1990.

Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen. In case of contact with material, immediately flush eyes with running water for at least 15 minutes. Wash skin with soap and water. Remove and isolate contaminated clothing and shoes at the site.

----- INITIAL INCIDENT RESPONSE -----

FIRE EXTINGUISHMENT: Alcohol foam, dry chemical, or carbon dioxide.
Note: Water may be ineffective CHRIS91

US Department of Transportation Guide to Hazardous Materials Transport Information - Publication DOT 5800.5 (1990).

DOT SHIPPING NAME: Isopropanol [or] isopropyl alcohol

DOT ID NUMBER: UN1219

ERG93

GUIDE 26

POTENTIAL HAZARDS

***FIRE OR EXPLOSION**

Flammable/combustible material; may be ignited by heat, sparks or flames. Vapors may travel to a source of ignition and flash back. Container may explode in heat of fire. Vapor explosion hazard indoors, outdoors or in sewers. Runoff to sewer may create fire or explosion hazard.

***HEALTH HAZARDS**

May be poisonous if inhaled or absorbed through skin. Vapors may cause dizziness or suffocation. Contact may irritate or burn skin and eyes. Fire may produce irritating or poisonous gases. Runoff from fire control or dilution water may give off poisonous gases and cause water pollution.

EMERGENCY ACTION

Keep unnecessary people away; isolate hazard area and deny entry. Stay upwind; keep out of low areas. Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection. *Isolate for 1/2 mile in all directions if tank, rail car or tank truck is involved in fire. CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, CALL CHEMTREC AT 1-800-424-9300. If water pollution occurs, notify the appropriate authorities.

***FIRE**

Small Fires: Dry chemical, CO₂, water spray or alcohol-resistant foam. Do not use dry chemical extinguishers to control fires involving nitromethane or nitroethane. Large Fires: Water spray, fog or alcohol-resistant foam. Move container from fire area if you can do it without risk. Apply cooling water to sides of containers that are exposed to flames until well after fire is out. Stay away from ends of tanks. For massive fire in cargo area, use unmanned hose holder or monitor nozzles; if this is impossible, withdraw from area and let fire burn. Withdraw immediately in case of rising sound from venting safety device or any discoloration of tank due to fire.

***SPILL OR LEAK**

Shut off ignition sources; no flares, smoking or flames in hazard area. Stop leak if you can do it without risk. Water spray may reduce vapor; but it may not prevent ignition in closed spaces. Small Spills: Take up with sand or other noncombustible absorbent material and place into containers for later disposal. Large Spills: Dike far ahead of liquid spill for later disposal.

***FIRST AID**

Move victim to fresh air and call emergency medical care; if not breathing, give artificial respiration; if breathing is difficult, give oxygen. In case of contact with material, immediately flush eyes with running water for at least 15 minutes. Wash skin with soap and water. Remove and isolate contaminated clothing and shoes at the site.

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CHEMTOX DATA

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----- IDENTIFIERS -----

CHEMTOX RECORD 360 LAST UPDATE OF THIS RECORD: 06/03/93
 NAME: SODIUM HYPOCHLORITE
 SYNONYMS: CHLOROX; ANTIFORMIN; B-K LIQUID; CARREL-DAKIN SOLUTION;
 CHLOROS; CLOROX; DAKINS SOLUTION; HYCLORITE; MILTON;
 BLEACH; HYPOCHLOROUS ACID, SODIUM SALT; SURGICAL
 CHLORINATED SODA SOLUTION; B-KLIQUID; DAKIN'S SOLUTION;
 HYCHLORITE; MERA INDUSTRIES 2MOM3B; SANITON TOOTHBRUSH
 SANITIZER; JAVELLE WATER; MODIFIED DAKIN'S SOLUTION;
 PIOCHLOR; PUREX; SODIUM HYPOCHLORITE (PENTAHYDRATE)
 CAS: 7681-52-9 RTECS: NH3486800
 FORMULA: ClHO.Na MOL WT: 75.45
 WLN:
 CHEMICAL CLASS: Mineral acid salt

See other identifiers listed below under Regulations.

----- PROPERTIES -----

PHYSICAL DESCRIPTION: sodium hypochlorite is usually found dissolved in
 water as a clear-yellowish water solution (if strong)
 or a clear colorless liquid (if weak). may also
 exist as a white crystalline solid. (nydh)

MELTING POINT:	dec	dec
BOILING POINT:	DEC	DEC
FLASH POINT:	Not available	
AUTO IGNITION:	Not available	
VAPOR PRESSURE:		
UEL:	~	
LEL:	~	
VAPOR DENSITY:	No data	
SPECIFIC GRAVITY:	1.06 20C	
DENSITY:	1.097	
WATER SOLUBILITY:		
INCOMPATIBILITIES:		

REACTIVITY WITH WATER:	No data on water reactivity
REACTIVITY WITH COMMON MATERIALS:	No data
STABILITY DURING TRANSPORT:	No Data
NEUTRALIZING AGENTS:	DESTROY WITH SODIUM BISULFITE OR HYPO AND WATER, THEN NEUTRALIZE WITH SODA ASH.
POLYMERIZATION POSSIBILITIES:	No data
TOXIC FIRE GASES:	None reported other than possible unburned vapors
ODOR DETECTED AT (ppm):	Data not available
ODOR DESCRIPTION:	Like bleach solution Source:CHRIS

100 % ODOR DETECTION: No data

----- REGULATIONS -----

DOT hazard class: 8 CORROSIVE
DOT guide: 60
Identification number: UN1791
DOT shipping name: HYPOCHLORITE SOLUTIONS WITH 16 PER CENT OR MORE AVAILABLE CHLORINE
Packing group: II
Label(s) required: CORROSIVE
Special provisions: A7, B2, B15, N34, T7
Packaging exceptions: 173.154
Non bulk packaging: 173.202
Bulk packaging: 173.242
Quantity limitations-
Passenger air/rail: 1 L
Cargo aircraft only: 30 L
Vessel stowage: B
Other stowage provisions: 26

STCC NUMBER: Not listed

CLEAN WATER ACT Sect.307: No

CLEAN WATER ACT Sect.311: Yes

CLEAN AIR ACT: Not listed

EPA WASTE NUMBER: D002

CERCLA REF: Y

DESIGNATION: B 100 pounds (45.4 kg) CERCLA

SARA TPQ VALUE: Not listed

SARA Sect. 312
categories:

Acute toxicity: Irritant
Acute toxicity: adverse effect to target organs.
Acute toxicity: corrosive
Chronic toxicity: carcinogen

UNITED STATES POSTAL SERVICE MAILABILITY:

Hazard class: Corrosive material - Mailable as ORM-D

Mailability: CM (A)

Max per parcel: 1 PT 15% SOLUTION

NFPA CODES:

HEALTH HAZARD (BLUE): Unspecified

FLAMMABILITY (RED) : Unspecified

REACTIVITY (YELLOW): Unspecified

SPECIAL : Unspecified

----- SUMMARY OF REGULATORY LISTS THIS SUBSTANCE APPEARS ON -----

ACGIH TLV list "Threshold Limit Values for 1992-1993"

Canadian Domestic Substances List
Canadian Ingredient Disclosure List. 20/01/88 Canada Gazette part II, Vol 122.
Clean Water Act Section 311 Hazardous Chemicals List.
Hazardous Materials Table. 49 CFR 172.101
EPA TSCA Chemical Inventory List 1986
EPA TSCA Chemical Inventory List 1989
EPA TSCA Chemical Inventory List 1990
EPA TSCA Chemical Inventory List 1992
EPA TSCA Test Submission (TSCATS) Database - April 1990
EPA TSCA Test Submission (TSCATS) Database - September 1989
Massachusetts Substance List.
New Jersey Right To Know Substance List. (December 1987)
Pennsylvania Hazardous Substance List
RCRA Hazardous Waste
SODIUM HYPOCHLORITE [7681-52-9]
Superfund/CERCLA RQ list. Table 302.4 in 54 FR 50968 (December 11, 1989)

----- TOXICITY DATA -----

SHORT TERM TOXICITY: INHALATION: symptoms of dust or mist exposure include blistering in throat, coughing, difficulty in breathing, lung congestion, nausea, vomiting, circulatory collapse, delirium, coma and death. SKIN: may cause strong irritation, rash, blistering, drying and cracking. Eyes: symptoms may include severe irritation. INGESTION: erosion of mucous membranes, holes in esophagus and stomach, vomiting, nausea, circulatory collapse, delirium, coma and death can occur. (NYDH)

LONG TERM TOXICITY: no information found. (NYDH)

TARGET ORGANS: skin, eyes, resp system

SYMPTOMS: Liquid can be irritating to skin and eyes if contact is maintained. Source: CHRIS

CONC IDLH: Nonegiven

NIOSH REL: Not given

ACGIH TLV: Not listed

ACGIH STEL: Not listed

WEEL (ACGIH): 2 mg/M3, 15 min (Short-Term TWA)

OSHA PEL: Not in Table Z-1-A

MAK INFORMATION: Not listed

CARCINOGEN?: N STATUS: See below

CARCINOGEN LISTS:

IARC: Not classified as to human
carcinogenicity or probably not
carcinogenic to humans.
MAK: Not listed
NIOSH: Not listed
NTP: Not listed
ACGIH: Not listed
OSHA: Not listed

LD50 value: orl-rat LD50:8910 mg/ kg

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1992)

orl-rat LD50:8910 mg/kg

IRRITATION DATA: (Source: NIOSH RTECS 1992)

Reproductive toxicity (1992 RTECS):

This chemical has no known mammalian reproductive toxicity.

REPRODUCTIVE TOXICITY DATA (1992 RTECS)

California Prop 65: Not listed

----- PROTECTION AND FIRST AID -----

PROTECTION SUGGESTED
FROM THE CHRIS MANUAL:

FIRST AID SOURCE: CHRIS Manual 1991

INGESTION: induce vomiting, give water, and repeat.

SKIN: wash off contacted skin area.

EYES: flush with plenty of water for 15 min. and consult a physician.

FIRST AID SOURCE: DOT Emergency Response Guide 1990.

Move victim to fresh air; call emergency medical care. In case of contact with material, immediately flush skin or eyes with running water for at least 15 minutes. Remove and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature.

----- INITIAL INCIDENT RESPONSE -----

US Department of Transportation Guide to Hazardous Materials Transport
Information - Publication DOT 5800.5 (1990).

DOT SHIPPING NAME: HYPOCHLORITE SOLUTIONS WITH 16 PER CENT OR MORE AVAILABLE CH

DOT ID NUMBER: UN1791

POTENTIAL HAZARDS

*HEALTH HAZARDS

Contact causes burns to skin and eyes.

If inhaled, may be harmful.

Fire may produce irritating or poisonous gases.

Runoff from fire control or dilution water may cause pollution.

*FIRE OR EXPLOSION

Some of these materials may burn, but none of them ignites readily.

Flammable/poisonous gases may accumulate in tanks and hopper cars.

Some of these materials may ignite combustibles (wood, paper, oil, etc.).

EMERGENCY ACTION

Keep unnecessary people away; isolate hazard area and deny entry. Stay

upwind; keep out of low areas. Positive pressure self-contained

breathing apparatus (SCBA) and structural firefighters' protective

clothing will provide limited protection. CALL Emergency Response

Telephone Number on Shipping Paper first. If Shipping Paper not

available or no answer, CALL CHEMTREC AT 1-800-424-9300. If water

pollution occurs, notify the appropriate authorities.

*FIRE

Some of these materials may react violently with water.

Small Fires: Dry chemical, CO₂, water spray or regular foam.

Large Fires: Water spray, fog or regular foam.

Move container from fire area if you can do it without risk.

Apply cooling water to sides of containers that are exposed to flames until

well after fire is out. Stay away from ends of tanks.

*SPILL OR LEAK

Do not touch or walk through spilled material; stop leak if you can do

without risk.

Small Spills: Take up with sand or other noncombustible absorbent material and place into containers for later disposal.

Small Dry Spills: With clean shovel place material into clean, dry container and cover loosely; move containers from spill area.

Large Spills: Dike far ahead of liquid spill for later disposal.

*FIRST AID

Move victim to fresh air; call emergency medical care. In case of contact with material, immediately flush skin or eyes with running

water for at least 15 minutes. Remove and isolate contaminated

clothing and shoes at the site. Keep victim quiet and maintain normal

body temperature.

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