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NAS PENSACOLA

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**COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION
NAVAL AIR STATION
PENSACOLA, FLORIDA**

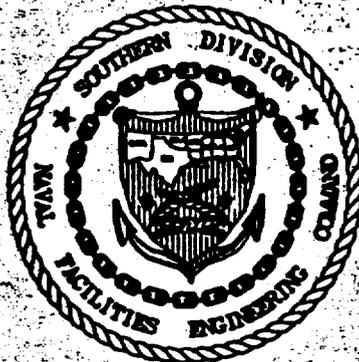


**FINAL HEALTH AND SAFETY PLAN
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
OPERABLE UNIT 10 (Sites 32, 33, and 35)**

Prepared for:

**DEPARTMENT OF THE NAVY
CHESAPEAKE DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
WASHINGTON, D.C.**

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Prepared by:

**ENSAFE/ALLEN & HOSHALL
5720 SUMMER TREES DRIVE, SUITE 8
MEMPHIS, TENNESSEE 38134
(901) 383-9115**

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**Release of this document requires the prior notification of the Commanding Officer of the
Naval Air Station, Pensacola, Florida.**

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1.0 INTRODUCTION

This Health and Safety Plan is written for field operations to be conducted at sites 32, 33, and 35, located at the Industrial Waste Water Treatment Facility (IWWTF) at the Naval Air Station Pensacola, Florida. Sites 32, 33 and 35 comprise Operable Unit 10. The Navy project contract number with EnSafe/Allen & Hoshall is N62467-89-D-0318. The monitoring program is being conducted to assess the nature and extent of contamination at the site and to determine if follow up action is required to maintain compliance with environmental regulations.

Applicability

The provisions of this plan are mandatory for all onsite personnel engaged in the environmental assessment who will be exposed or have the potential to be exposed to onsite hazardous substances. All personnel will operate in accordance with the most current requirements of 29 CFR 1910.120, *Standards for Hazardous Waste Workers* and Emergency Responders. These regulations include the following provisions for employees exposed to hazardous substances, health hazards or safety hazards: training as described in 120(e), medical surveillance as described in 120(f), and personal protective equipment described in 120(g). All field personnel assigned to field activities for the project must read this plan and sign the plan acceptance form before the start of site activities. At a minimum, all provisions of the E/A&H health and safety plan will be followed.

E/A&H will suspend the site work and will instruct the subcontractor to evacuate the area under the following conditions: If inadequate safety precautions are taken by the subcontractor or DOD oversight personnel, or if it is believed that the subcontractor or DOD oversight personnel are or may be exposed to an immediate health hazard.

Health and safety training certificates for all E/A&H employees who may visit the site are provided in Appendix A. Current OSHA refresher training certificates will be available onsite for all employees involved in field activities whose refresher course requirements come up for

renewal before the project begins. All subcontractors, DOD oversight personnel, and any other site visitors must provide ~~Health~~ and Safety certification with appropriate refresher course documentation prior to site entry. At least one E/A&H employee certified in Red Cross cardiopulmonary resuscitation (CPR) and First Aid will be onsite during all site activities.

2.0 Site Characterization

2.1 Work Areas

Site control will be established and maintained according to the recommendations in the EPA's *Interim Standard Operating Safely Guides*, Revised September, 1982. Three general zones of operation will be established to reduce the potential for contaminant migration and risk of personnel exposure:

- The exclusion zone.
- e The contamination reduction zone.
- e The support zone.

The exclusion zone will be located so that the area between the decontamination station and the work area entrances will be included. The contamination reduction zone will include the decontamination station and the support zone will be located beyond the contamination reduction zone. **Only** authorized personnel with a minimum of **40** hours health and safety training meeting the requirements of OSHA 29 CFR 1910.120 are permitted within the exclusion and contamination reduction zones.

The exclusion zone is the area known or suspected of being contaminated with hazardous substances. The exclusion zone will be defined locally but is suggested to be within 20 feet of either side or the rear of the drill rig. All personnel within the exclusion zone must use the prescribed level of personal protection. A checkpoint will be established at the edge of the exclusion zone to regulate the flow of personnel and equipment in and out of the area. All personnel crossing the hotline into the exclusion zone must use the buddy system.

The person entering the exclusion zone must be accompanied by a person who is able to:

- e Provide his or her partner with assistance.
- e Observe his or her partner for signs of chemical or heat exposure.

- e Periodically check the integrity of his or her partner's protective clothing.
- e **Notify** the **shift** supervisor, his representative or others if emergency help is needed.

Additionally, at least one person **shall** remain outside the exclusion zone and have available at least the same level of **personal** protective equipment (**PPE**) as the buddies who are entering the exclusion zone. The person outside the exclusion zone **will** act **as** the **safety** observer and **perform** the **security** duties described in the next section which is labeled **Work Area Access**.

The contamination reduction **zone** serves **as** a buffer between the exclusion zone **and** the **support** zone and is intended to prevent the spread of contaminants **from** the work areas. **All** decontamination procedures **will** be conducted in **this** area. Personnel will leave the **support** zone and enter the Contamination reduction zone through **a** controlled **access** point. They must wear the prescribed **PPE**. **Exiting** the contamination reduction zone requires the removal of **all** contaminants through **compliance** with established decontamination procedures.

The support **zone** is the outermost **area** and is considered **a** non-contaminated or clean **area**. The support **area** will be equipped with **an** appropriate first-aid station and equipment **to perform** **gross** decontamination of equipment.

22 Work Area Access

All personnel entering **the** site exclusion zone **must**:

1. Check in with **the** E/A&H Field Project Manager or representative.
2. Provide **the shift** supervisor with the **following** information:
 - e The names of individuals entering **the** site work **area**.
 - Destination in the site **work area**.
 - Activity to **be performed** at that location.
 - Duration of **the** planned activity.

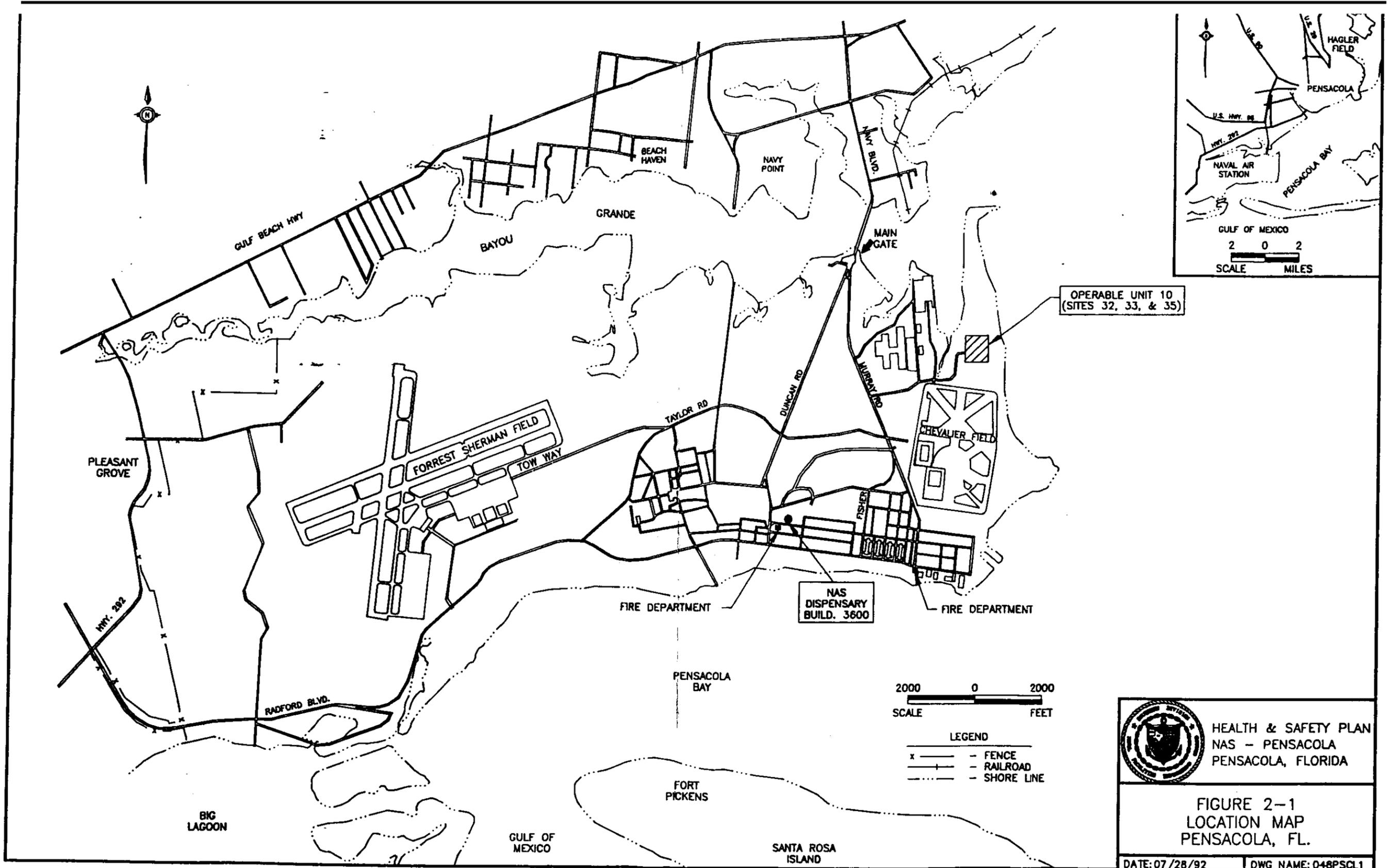
The Field Project Manager will **inform persons** entering the site work **area** of the location of other activities taking place during the scheduled entry. If the Field Project Manager determines it is not **safe** for the scheduled entry, he or she **can** reschedule the entry or stop **all** other activities to **perform** the specific task.

3. When leaving the site work **area**, proceed directly to the decontamination station and check out with the Field **Project** Manager or **his** representative. All **exits from** the site work **area** must be made through the contamination reduction zone.
4. Perform all **necessary** decontamination **before** leaving the contamination reduction zone.

2.3 **Site Map and Work Zones**

The location of the work **area** is shown on Figure 2-1, Location Map and Figure 2-2, Site Map. The limit of the exclusion **area** and location and limit of the **decontamination** corridor and support **area** will be based on existing physical **assets** such as location of utilities, mads, and **security** assets. (See the previous section **labeled Work Areas**)

When **drilling** within 50 yards of the Chemical **Tank** Farm, the eye wash station there **will** be used. All other chemicals will be used at the decontamination station and E/A&H will provide a portable eye **wash** system there.



OPERABLE UNIT 10
(SITES 32, 33, & 35)

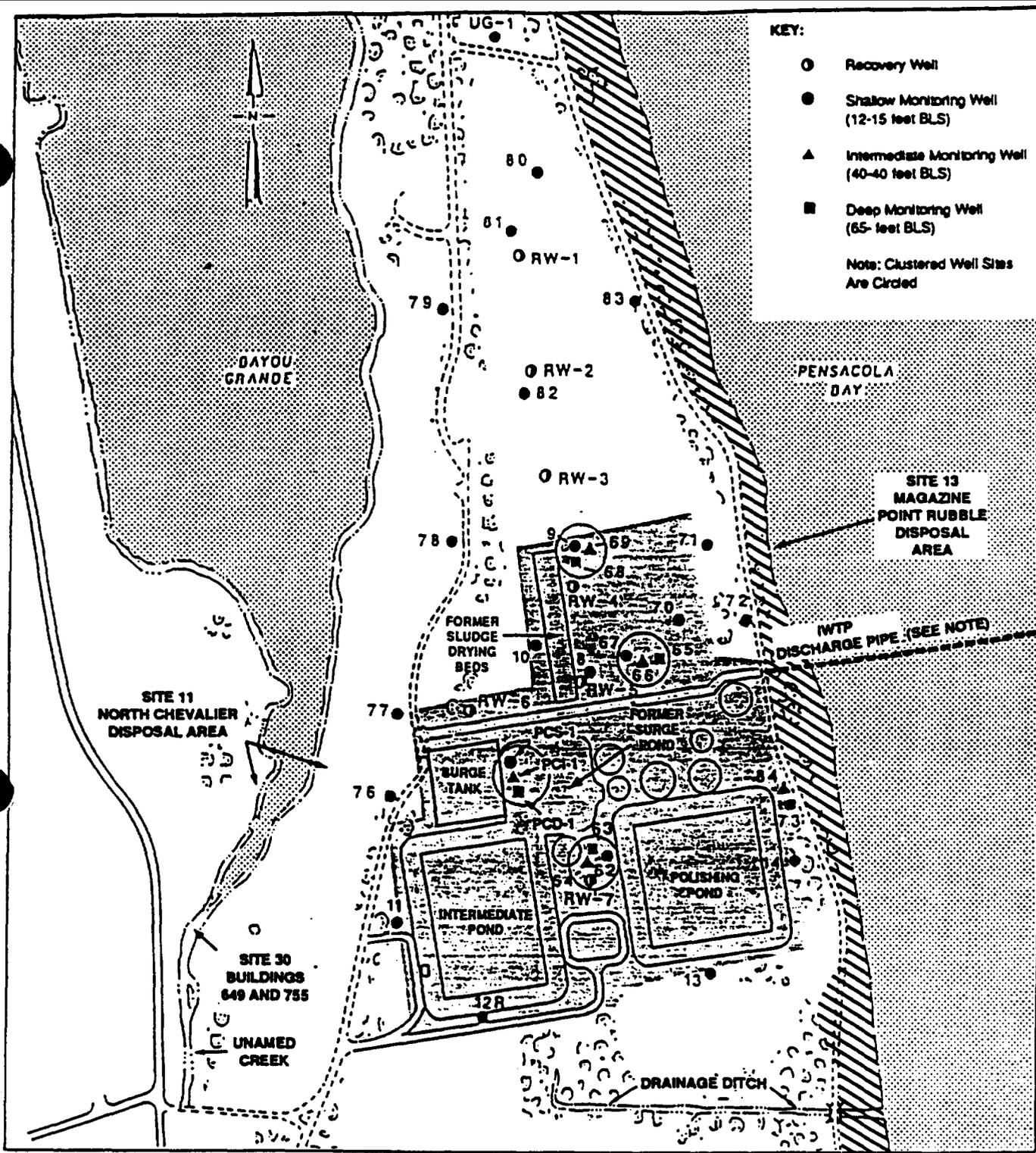
2000 0 2000
SCALE FEET

LEGEND
 x — — FENCE
 —+— RAILROAD
 - - - SHORE LINE



HEALTH & SAFETY PLAN
 NAS - PENSACOLA
 PENSACOLA, FLORIDA

FIGURE 2-1
 LOCATION MAP
 PENSACOLA, FL.



SOURCE: Geraghty & Miller, Inc., 1988;



Shaded area Encompasses Sites 32, 33, and 35

IWTP Industrial Wastewater Treatment Plant

Note: Discharge point for this pipe located approximately 2,500' out in the Pensacola Bay.

Figure 2-2 SITE MAP — NAS PENSACOLA, SITES 32, 33, AND 35

3.0 **SITE ACTIVITIES**

The **activities** to be performed during the investigation include a **soil gas** survey which **calls** for **275** soil **gas** measurements and the **drilling** and sampling of **12** **soil** brings. **Six** shallow groundwater **monitoring** wells, **10** intermediate wells, and one deep well will be installed. Four **surface** water and four sediment samples **will** be collected at the IWWTP. Subsequent activities **will** include well purging, development, and sampling **as** required. Field **work** descriptions **are** provided in the Sampling and Analysis Plan (SAP) by E/A&H.

4.0 CHEMICAL HAZARDS

Previous sampling operations reveal the potential for exposure to numerous chemical substances. Table 4-1 lists exposure guidelines for expected site chemicals. A summary of potential contaminants was obtained from the Ecology and Environment, Inc. document entitled *Remedial Investigation/Feasibility Study Work Plan - Group O, Naval Air Station Pensacola, Pensacola, Florida* submitted to SOUTHDIY in February 1992. Listed below are the potential chemical hazards posed by these materials. Material Safety Data Sheets for these materials are included in Appendix B.

Benzene is considered a human carcinogen by NIOSH as well as other organizations. As a result, all appropriate precautions should be taken to avoid or at the very least, limit exposure to benzene. Signs of exposure include: dizziness, weakness, euphoria, headache, nausea, vomiting, tightness of the chest, and staggering. With more severe exposure signs include blurred vision, tremors, shallow and rapid respiration, ventricular irregularities, paralysis, and unconsciousness.

Toluene is considered a moderate health hazard by the NFPA. Symptoms of exposure include: dizziness, exhilaration, and confusion at lower acute exposure levels. Incoordination, ataxia, unconsciousness, and death (eventually) may occur at high level acute exposures.

Cyanide is considered a severe health hazard by NFPA. It may be fatal if inhaled, swallowed or absorbed through the skin. Contact with this substance may cause burns to the skin and eyes. Signs of exposure include: weakness, headache, confusion, nausea, vomiting, increased respiratory rate or slow, gasping respirations, scarlet rash, itching, blindness, rise in blood pressure, irregular pulse, giddiness and anxiety.

1,2-Dichlorobenzene (O-Dichlorobenzene) is considered a slight health hazard by NFPA. Short exposure at high concentrations may result in depression of the Central Nervous System. Vapors

are irritating to eyes, nose and throat. It may cause burning pain in stomach, nausea, vomiting and diarrhea if ingested. Prolonged exposures may result in liver and kidney damage.

1,3-Dichlorobenzene (m-Dichlorobenzene) is considered a severe health hazard by **NFPA**. Signs of exposure include eye, skin and mucous membrane irritation, headache, drowsiness, and liver damage.

1,4-Dichlorobenzene is considered a moderate health hazard by **NFPA**. Signs of exposure include irritation of the eyes and upper respiratory tract, **CNS** depression, nausea, vomiting, diarrhea, a burning pain in the stomach resulting from ingestion, and liver and kidney damage. Prolonged exposure may result in irritation of the skin.

Sodium is considered a slight health hazard by **NFPA**. Sodium metal in contact with water or perspiration reacts vigorously, forming sodium hydroxide fumes which are highly irritating to skin, eyes, nose, and throat. Severe exposure may result in difficult breathing, coughing, and chemical bronchitis. Contact with skin may cause itching, thermal and caustic burns, resulting in permanent damage. Contact with eyes may result in permanent damage and loss of sight. Ingestion of sodium may cause intense burning sensation in the mouth, throat and stomach, followed by salivation, vomiting, rapid breathing, shock, diarrhea, loss of consciousness, and death.

Cadmium dust exposures may produce symptoms of nose and throat irritation, chest pain, sweating, chills, dyspnea, weakness, nausea, vomiting, diarrhea, abdominal cramps, and possible death. Prolonged exposure may result in loss of smell, nose ulceration, dyspnea, emphysema, kidney damage, and mild anemia.

Table 4-1 Exposure Guidelines for Expected Site Chemical Hazards						
Chemical Name	Odor ⁽¹⁾ Threshold (ppm)	OSHA PEL ⁽²⁾ (ppm)	ACGIH TLV ⁽³⁾ (ppm)	NIOSH REL ⁽⁴⁾ (ppm)	Auto-ignition Temp.(°F)	Flammable range (% by volume)
Benzene	4.68	1.0; 5.0 STEL	0.1 Suspect Human Carc.	0.1; 1.0 STEL Potential Occupational Carcinogen	1096	1.3 to 7.1%
Toluene	40	100	100	100	996.5	1.3 to 7.1 %
Cyanide	N.A.	5 mg/m ³	5 mg/m ³ Skin	4.7 ppm Ceiling	N.A.	N.A.
1,2-Dichlorobenzene	N.A.	50 ppm Ceiling	50 Ceiling Skin	50 Ceiling	1198	2.2 to 9.2%
1,3-Dichlorobenzene	N.A.	N.A.	N.A.	N.A.	N.A.	N.A.
1,4-Dichlorobenzene	N.A.	75 110 ppm STEL	75 110 ppm STEL	Potential Occupational Carcinogen	N.A.	N.A.
Sodium	N.A.	N.A.	N.A.	N.A.	249.5	N.A.
Cadmium (Dust)	N.A.	0.2 mg/m ³ Ceiling	0.05 mg/m ³	Potential Occupational Carcinogen	N.A.	N.A.
Chromium (Metal)	N.A.	1 mg/m ³	0.5 mg/m ³	0.5 mg/m ³	N.A.	N.A.

Table 4-1 Exposure Guidelines for Expected Site Chemical Hazards						
Chemical Name	Odor⁽¹⁾ Threshold (ppm)	OSHA PEL⁽²⁾ (ppm)	ACGIH TLV⁽³⁾ (ppm)	NIOSH REL⁽⁴⁾ (ppm)	Auto-ignition Temp. (°F)	Flammable range (% by volume)
Lead	N.A.	0.05 mg/m ³	0.05 mg/m ³	0.1 mg/m ³	N.A.	N.A.
Arsenic	N.A.	0.01 mg/m ³	0.2 mg/m ³	0.002 mg/m ³ Ceiling Pot. occ. Carcinogen	N.A.	N.A.
Mercury	N.A.	0.05 mg/m ³ Skin	0.1 mg/m ³ Skin	0.05 mg/m ³	N.A.	N.A.
Vinyl Chloride	3000	1.0 5.0 Ceiling	5.0 Confirmed Human Carc.	Potential Occupational Carcinogen	881	3.6 to 33%
1,2-Dichloroethane	N.A.	1.0 2.0 STEL	10 15 STEL	1.0 2.0 Ceiling Potential Occupational Carc.	775	6.2 to 15.6%
Chloroform	205	2.0	10 Suspected Human Carc.	2.0 STEL Potential Occupational Carc.	N.A.	N.A.

Table 4-1 Exposure Guidelines for Expected Site Chemical Hazards						
Chemical Name	Odor⁽¹⁾ Threshold (ppm)	OSHA PEL⁽²⁾ (ppm)	ACGIH TLV⁽³⁾ (ppm)	NIOSH REL⁽⁴⁾ (ppm)	Auto-ignition Temp.(°F)	Flammable range (% by volume)
Carbon Tetrachloride	N.A.	2.0	5.0 Skin Suspected Human Carc.	2.0 STEL Potential Occupational Carc.	N.A.	N.A.
Trichloroethylene	0.5 - 167	50 200 STEL	50 200 STEL	25 Potential Occupational Carc.	770	11 to 41%
Tetrachloroethylene	N.A.	25	50' 200 STEL	Lowest Feasible Exposure Potential Occupational Carc.	N.A.	N.A.

Notes:

- 1 Odor Thresholds for Chemicals with Established Occupational Health Standards, American Industrial Hygiene Association, 1989, Range of All Reference Values
 - 2 29 CFR 1910.1000, Table Z-1-A. Limits For Air Contaminants, as amended through 1/15/91.
 - 3 1990 - 1991 Threshold Limit Values for Chemical Substances and Physical Agents and Biological Exposure Indices, ACGIH
 - 4 NIOSH Pocket Guide to Chemical Hazards, June 1990.
- N.A. = Substance information not available, or substance unlisted.

Chromium dust exposure may cause irritation of the nose, throat, lungs, and eyes. Skin contact may result in irritation. Ingestion may produce mouth and throat irritation.

Lead exposure may result in **insomnia**, eye grounds, anorexia, low-weight, malnutrition, constipation, abdominal **pain**, colic, anemia, **gingival** lead line, eye grounds, and trembling paralysis wrist (**wrist-drop**).

Arsenic is considered a human carcinogen by **NIOSH** as well as other organizations. **As** a result, **all** appropriate precautions should **be** taken to avoid or at the very least, limit exposure to arsenic. Signs of exposure include: coughing, dyspnea, chest pains, irritation to skin and **mucous** membranes, fever, **insomnia**, liver swelling, melanosis, **disturbed** heart function, facial edema, and death.

Mercury exposure may produce coughing, chest pain, dyspnea, bronchitis, pneumonia, tremors, insomnia, irritability, indecision, headaches, fatigue, weakness, salivation, **gastrointestinal disturbance**, anorexia, weight loss, and irritation of the eyes and skin. Prolonged exposure may result in **destruction** of the **CNS**, teeth, and gums, and the development of mercury poisoning.

Vinyl **chloride** is considered a moderate health hazard by **NFPA** and a human carcinogen by **NIOSH** as well as other organizations. **As** a result, **all** appropriate precautions should be taken to avoid or **at** the very least, limit exposure to vinyl chloride. Signs of exposure include: drowsiness, abdominal **pains**, numbness and tingling in fingers and toes, pains **in** joints, coughing, sneezing, irritability, **and** loss of appetite and weight. Contact with liquid may **cause** frostbite, contact with vapor may **cause** irritation and rash. Vinyl chloride may be readily **absorbed** through the *skin*. Prolonged exposure may **cause** skin to become thickened and **stiff** with *coarse*, whitish patches. Liver and spleen damage may **occur**.

1,2-Dichloroethane (ethylene dichloride) is considered a moderate health hazard by NFPA and a human carcinogen by **NIOSH** and other organizations. **As** a result, all appropriate precautions should **be** taken to avoid or at the very least, limit exposure to **1,2-Dichloroethane**. Signs of exposure include: **dizziness**, nausea, vomiting, **weakness**, headaches, abdominal cramps, liver and kidney damage, fluid build up in the lungs, **coma**, and death. Ingestion of 2 ounces **has** resulted in **nausea**, **faintness**, drowsiness, difficult breathing, pale *skin*, internal bleeding, kidney damage, and **death** due to respiratory failure.

Chloroform is considered a moderate health hazard by NFPA and a human carcinogen by **NIOSH** and other organizations. **As** a result, all appropriate precautions should **be** taken to avoid or at the very least, limit exposure to chloroform. **Signs** of exposure include headaches, pounding heart, **dizziness**, slowed reactions, unconsciousness, coma, and death. Contact with skin may cause reddening, blistering, and chemical burns. Ingestion may **cause nausea**, vomiting, jaundice, profuse sweating, liver damage and coma. Death by ingestion may occur from 1 ounce.

Carbon tetrachloride is considered a severe health hazard by **NFPA** and a human carcinogen by **NIOSH** and other organizations. **As** a result, all appropriate precautions should **be** taken to avoid or at the very least, limit exposure to carbon tetrachloride. Symptoms of exposure include: headache, vomiting, visual disturbances, extreme fatigue, nose and throat irritation, and **respiratory** failure. Other symptoms include loss of balance, tremors, liver, kidney, and eye and nerve damage. **Carbon** tetrachloride may be readily absorbed through the skin to produce the symptoms **listed** above. Skin contact may **also** cause irritation and redness. Ingestion may cause severe **abdominal** pain **with** diarrhea, **followed** by the symptoms described above. **Death** may occur by ingestion of **as little as 1/2 teaspoon**.

Trichloroethylene is considered a moderate health hazard by NFPA and a human carcinogen by NIOSH. As a result, all appropriate precautions should be taken to avoid or at the very least, limit exposure to trichloroethylene. Signs of exposure include: headache, drowsiness, nausea, vomiting, dizziness, unconsciousness, and death. Trichloroethylene may be absorbed through the skin and cause irritation, burning, or redness. Ingestion may result in abdominal pain, unconsciousness, liver or kidney damage, and death. Prolonged exposure may cause nervous exhaustion, sensitivity to alcohol, numbness in the fingers, and a change in heart rate.

Tetrachloroethylene is considered a moderate health hazard by NFPA and a human carcinogen by NIOSH and other organizations. As a result, all appropriate precautions should be taken to avoid or at the very least, limit exposure to tetrachloroethylene. Signs of exposure include: irritation of the nose, mouth, throat, and eyes, headaches, dizziness, loss of muscle control, weakness, tremors, convulsions, paralysis, coma, and death. Skin contact may result in dry, scaly skin with a mild to moderate burning sensation, redness and inflammation. Ingestion may cause nausea, vomiting, diarrhea, bloody stool, reddening of face and neck, and loss of muscle control. Prolonged exposures may result in sleeplessness, constipation, increased perspiration, skin infection, kidney and liver damage, fluid in the lungs, and coma.

5.0 OPERATIONS AND PHYSICAL HAZARDS

Heavy equipment and drill rig operations will be conducted in accordance with the procedures outlined in Appendix C. Personnel conducting drill rig operations **shall keep** clear of **all** moving parts. Loose clothing **shall** not be worn **to** prevent entanglement **with the** drill rig. When conducting operations or survey work on foot, personnel **will** walk at **all** times. **Running** greatly increases **the** probability of slipping, tripping, and falling. When **working** in areas that support habitat for poisonous **snakes**, personnel shall wear protective chaps made of a **heavy** material designed **to** prevent snake bites to the legs. Additional *care* should be taken to avoid contact with **fire ants**. Benedryl will be provided in the first-aid kits for **fire ant** bites.

6.0 EMPLOYEE PROTECTION

Employee protection for **this** project includes **standard** safe work practices, **personal** protective equipment, personal decontamination procedures and equipment for extreme weather conditions, **work** limitations, and exposure evaluation. All work will be performed in conformance with OSHA regulations and the Army *Corps* of Engineers *Safety* and *Health Manual EM 385-1-1*.

Standard Safe Work Practices:

- 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 Officer.
- Hands and face must **be** thoroughly washed upon leaving the work **area**.
- **No** contact lenses will be **worn** in work areas while invasive actions **are** conducted.
- 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 contaminated or suspected contaminated surfaces should be avoided. Whenever possible, do not walk through puddles, leachate or discolored surfaces, or lean, sit, or place equipment on drums, containers, or on **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 is prohibited.
- **Due to** the possible presence of overhead power lines, adequate side and overhead clearance should be maintained to ensure that the **drill rig boom** does not touch or **pass** close to any overhead lines.
- Due to the possible presence of underground utilities (including electric, **natural** gas, water, sewer, telephone, etc.), the activity and local utility representatives should be

contacted and **requested** to identify all lines at the ground surface using characteristic spray paint or labeled stakes. A 3-yard buffer zone should be maintained during all subsurface investigations.

- o Due to the flammable properties of the potential chemical **hazards**, all **spark** or ignition **sources** should be bonded and/or grounded or mitigated before **soil** boring advancement or other site activities **begin**.

NAS Pensacola General Rules of Conduct:

- Liquor, firearms, narcotics, **tape** recorders, and other contraband items are not **permitted** on the premises.
- o Any violation of local, state, or federal laws, or conduct which is outside the generally accepted **moral** standards of the **community** is prohibited.
- o Violation of the Espionage Act, or willfully hindering or **limiting** production or sabotage is not **permitted**.
- Willfully damaging or **destroying** property, or removing government **records** is forbidden.
- o Misappropriation or unauthorized **altering** of any government **records** is forbidden.
- o Securing government **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 government shop or **office**, using government property or material for **unauthorized** purposes, or **using** government telephones for **unnecessary** or **unauthorized** local or long **distance** telephone **calls** is forbidden.
- **Compliance** with **posted** signs and **notices** is required.
- **Boisterousness** and noisy or offensive work habits, abusive language, or **any** verbal, written, symbolic, or other communicative expression which tends to disrupt the work of others or **mode** is forbidden.
- o Fighting or threatening **bodily** harm to another is forbidden.

- e Defacing **any** government property is forbidden.
- Wearing **shorts** of **any type** and/or offensive logos, pictures, or phrases on clothing is forbidden. **Shirts**, shoes and pants or slacks or coverall-type garments **will be worn** at all times on government property.
- e All persons **operating** motor vehicles **will obey** all **NAS** Pensacola traffic regulations.

6.1 Personal Protective Equipment

Field activities which **disturb soils will be** initiated **in** Level D protection. Level D protection consists of **work** coveralls (**full** length sleeves and pants), hard hat, appropriate chemical-resistant gloves (vinyl or nitrile), eye protection, and chemical-resistant, steel-toed and shank boots. **This** level of protection **was** chosen because the levels of contamination detected **by** previous **studies** were generally low and **free** product **has** not been detected.

Air monitoring for volatile organic compounds **will be performed** continuously during **all** sampling activities. **Air** monitoring instrumentation **will** be continuous **reading**. Additional PPE upgrades to Level **C** **will be** initiated **if** airborne concentrations exceed **5 ppm** above the background concentrations in the **breathing** zone. Level **C** **will be** initiated if concentrations of any contaminant exceeding **50** percent of the **OSHA** Permissible Exposure Limit (PEL) **are encountered**. See Table **6-1** for the **specific** criteria for **use** and equipment for each level of protection.

Table 6-1 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 guide.) • 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 rite activities. • Where atmospheres are oxygen deficient. • 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 30 minute 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, glove end boot, worn over fully encapsulating suit
Level B	<ul style="list-style-type: none"> • When work areas contain less than 19.6 percent oxygen • When concentration of vinyl chloride exceed 50% of PEL 	<ul style="list-style-type: none"> • Chemical resistant clothing, long sleeves, hooded, one or two piece • Positive pressure-demand full facepiece self contained breathing apparatus or positive pressure demand supplied air respirator with 30 minute escape SCBA • 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 particulate (dust) warrant respiratory protection • When work areas contain at least 19.6 percent oxygen 	<ul style="list-style-type: none"> • Chemical resistant clothing, long sleeves, hood optional, one or two piece • Full-faced piece, air purifying respirator equipped with cartridge suitable for the hazard • Hard hat • Inner glove and chemical resistant gloves • Steel toe and shank boots • Coveralls and disposable outer boots
Level D	<ul style="list-style-type: none"> • When level B or C is not indicated • When airborne particulate do not warrant respiratory protection • When work areas contain at least 19.5 percent oxygen 	<ul style="list-style-type: none"> • Inner gloves and chemical-resistant gloves needed to handle soil or water sampler • Steel toe and shank boots • Hard hat (ANSI 2891-1969 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 ppm 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 are known, or reasonably assumed to be no greater than the protection factors associated with air-purifying respirator, 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 function preclude splashes, immersion, or the potential for unexpected inhalation or contact with hazardous levels of any chemicals.

Selection of **Personal** Protective Equipment

It is important that **personal** protective equipment **be** appropriate to protect against **the** potential or known **hazards** at each cleanup or investigation **site**. Protective equipment will be selected based on 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 **personal** protective equipment required, based on past experiences and sound safety practices.

The appropriate level of protection will **be** determined **before** the **initial** entry based on the best available information. Subsequent information, (e.g., sampling results and site observations), may require changes in the original level selected.

Respirator **Fit Testing**

The *fit*, i.e., integrity of the facepiece-to-face **seal** of a respirator affects its performance. A secure fit is important **with** positive-pressure equipment, and is **essential** to the safe functioning of negative-pressure equipment, such as most air-purifying respirators. Most facepieces fit only a **certain** percentage of the population; thus each facepiece must **be** tested on the potential wearer in order **to** ensure a tight **seal**. Facial features such as **scars**, hollow temples, very prominent cheekbones, **deep** skin **creases**, dentures or missing teeth, and the chewing of **gum** and tobacco **may** interfere with the respirator-to-face **seal**. A respirator shall not **be** worn when such conditions prevent a good seal. The workers' diligence in observing these factors **shall be** evaluated by periodic checks.

For a qualitative respirator fit testing protocol, **see** Appendix D of the OSHA lead **standard** (29 CFR Part 1910.1025). For quantitative fit testing, **see** the NIOSH publication A **Guide to Industrial Respiratory** Protection. For specific quantitative testing protocols, literature supplied **by** manufacturers of quantitative fit test equipment should **be** consulted. **Note** that **certain** OSHA

standards require quantitative fit testing under specific circumstances (e.g., 29 CFR Parts 1910.1018 [h] [3] [iii], 1910.1025 [f] [3] [iii], and 1910.1045 [h] [3] [iii] [B]).

6.2 Air Monitoring

Air monitoring will be accomplished using a photoionization detector (PID) and a combustible gas indicator (CGI) during all borings and ground water well installations. The PID will be field calibrated to measure volatile organic compounds relative to a benzene standard. Background (ambient) PID and CGI readings in the breathing zone will be collected before each day's field activities begin. This value will be recorded in the field logbook. If volatile organic compound concentrations in the breathing zone exceed background (ambient) readings by 5 ppm or more, or if concentrations of any contaminant exceeding 50 percent of the OSHA PEL are encountered, field activities will immediately cease. When site activities stop, the Field Project Manager must contact the Health and Safety Officer. The Health and Safety officer will be responsible for reassessing the hazards and prescribing revised health and safety requirements as necessary including upgraded personal protective equipment requirements, revised work schedules, and revised decontamination procedures.

Field technicians will be made aware that they must report any unusual odors or soil discolorations. Each instrument shall be calibrated daily before site activities begin and checked for proper operation during the day. At the end of each work day and before calibration, each instrument shall be checked to ensure that it is free from surface contamination.

6.3 Procedures and Equipment for Extreme Weather Conditions

Field activities for this investigation are scheduled to last approximately four weeks. The seasonal climate in Florida can be expected to be hot with high relative humidity; therefore, heat stress will be of concern for all personnel. Adverse weather conditions are important considerations in planning and conducting site operations. Extremes in hot weather can cause physical discomfort, loss of efficiency and personal injury.

Heat Stress

~~Heat~~ stress *can* result when the protective clothing ~~decreases~~ natural body ventilation even when ~~temperatures are~~ moderate. Working under various levels of ~~personal~~ protection may require wearing low permeability disposable suits, gloves and boots. This clothing will prevent most natural body ventilation. Discomfort due to increased sweating and body temperature (heat stress) will be expected at the work site.

Heat stress is the metabolic response to environmental temperatures to which an individual is exposed. The manifestations of heat strain are the adjustments made by an individual in response to the stress. The three most important categories of heat-induced illness are: heat exhaustion, heat cramps, and heat stroke. These disorders can occur when the normal responses to increased sweat production are not adequate to meet the needs for body heat loss or when the temperature regulating mechanisms fail to function properly.

Heat exhaustion is a state of collapse brought about by an insufficient blood supply to the cerebral cortex portion of the brain. The crucial event is low blood pressure caused by inadequate heart output and widespread expansion of blood vessels.

Heat Exhaustion Factors — Factors which *can* lead to heat exhaustion are as follows:

- Dilation of blood vessels caused by decreased capacity of circulation to meet the demands for heat loss to the environment, exercise, and digestive activities.
- Decreased blood volume due to dehydration.
- Reduced blood volume due to lack of physical training, infection, intoxication (from industrial contaminants as well as from drinking alcohol), or heart failure.

Heat Exhaustion Symptoms — The symptoms include extreme weakness or fatigue, dizziness, nausea, or headache. More severe cases may also involve vomiting and possible unconsciousness. The skin becomes clammy and moist, the complexion pale, and the oral

temperature stays normal or low but the rectal temperature is usually elevated (99.5°F - 101.3°F). Workers who are unacclimated run the highest risk.

Heat Exhaustion Treatment — In most cases, treatment of heat exhaustion is fairly simple. The victim will be moved to a cool place. If the victim is unconscious, medical assistance must be sought. Mild cases may experience immediate recovery; however, more severe cases may require several days care. No permanent effects have ever been reported.

Heat cramps result when the working muscles go into painful spasms. This may occur in those who perspire profusely in heat and who drink large quantities of water, but who fail to replace their bodies' low salt. Low salt content in the blood causes the cramping. The abdominal muscles as well as the muscles in the arms and legs may be affected. The cramps may appear during or even after work hours. Persons on a low sodium diet should not be given salt. A physician must be consulted for their care.

Heat stroke is the most serious of the health problems that arise while working in hot environments. It is caused by the breakdown of the thermo-regulatory system under stress. When this happens, perspiration stops and the body can no longer regulate its own temperature.

Heat Stroke Symptoms — A heat stroke victim may be identified by hot, dry, and usually red or spotted skin. The body core temperature can exceed 105°F. Mental confusion, irritability and chills are common. These are all early warning signs of heat stroke; if the sufferer is not removed from the hot environment at once, more severe symptoms can follow, including unconsciousness, delirium, and convulsions, possibly ending in death.

Heat Stroke Treatment — Heat stroke victims must be treated as a major medical emergency; medical assistance must be summoned immediately.

Additional treatment:

- First aid must be administered.
- Individual must be moved **to** a cool location.
- Individual must be cooled through wetting, fanning, or immersion.

Care should be taken to avoid over-cooling and treatment for shock by **raising** the legs. Early recognition/treatment **is** the **only** way to prevent permanent brain damage or death.

To reduce the potential for heat strokes:

- **Drink** plenty of fluids (**to** replace loss through sweating).
- **Wear** cotton undergarments to act **as a** wick to absorb **moisture**.
- Make adequate shelter available for taking rest breaks to cool **off**.

Additional Measures for Extremely Warm Weather:

- **Wear** cooling devices to aid in ventilation. (**NOTE:** the **additional** weight may **affect** efficiency.)
- Install portable showers or hose-down facilities to cool clothing and body.
- **Shift working** hours to early morning **and** early evening. Avoid the hottest time of the day.
- Frequently rotate crews **wearing** the protective clothing (if **required**).

6.4 Personal Decontamination

A decontamination zone will be **established** next to each sampling site and will include **an** area ~~for~~ sampling equipment **and** **personal** decontamination. The decontamination **zone** will consist of a 20-foot **by** 20-foot sheet of 6-mil polyethylene with specific stations that will accommodate the removal **and** **disposal** of the protective clothing, boot covers, gloves and **respiratory** protection if **required**.

6.4.1 Personal Decontamination Procedures

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

- 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.
- Remove outer chemical protective clothing.
- **Wash** and **rinse** inner gloves.
- Washing hard hats **and** eye protection thoroughly at the end of each work day with a soap and water solution.
- Disposing of disposable gloves and any disposable clothing in sealable bags and placing **them** in a dumpster for disposal at the site.
- Instructing **all** field personnel to shower **as soon** as possible after leaving the site.

Decontamination procedures will be conducted at the lunch break and at the end of each work day. If higher levels of **personal** protection equipment are **needed**, adjustments will be made to **these** procedures and **an** amendment will be made to **this** health and **safety** plan.

All wastes (soil and water) generated during personal decontamination will be **collected** in 55-gallon drums. The drums will be labeled by E/A&H personnel for **final** disposal by **the** Navy in an approved and regulated facility. An analysis will not be conducted **on** disposable **debris**, for example rubber gloves, coveralls, **and** paper towels, before depositing the debris in the **drums**.

6.4.2 Closure of the Personal Decontamination Station

All disposable clothing and plastic sheeting **used** during site activities will be double-bagged **and** **disposed** in a **refuse container**. **Decontamination** and **rinse** solutions will be placed in a lined 55-gallon drum for later analysis and disposal. All washtubs, pails, buckets, etc. will be washed, **rinsed** and **dried** at the end of each workday.

6.5 Work Limitations

All site activities will be conducted during daylight hours 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(e). **All** supervisors must complete an additional eight hours of training in site management. All personnel must complete an eight-hour refresher training course on an **annual** basis in order to continue working at the site.

6.6 Exposure Evaluation

All personnel scheduled for site activities have had a baseline physical examination which includes a stressing exam of the neurologic, cardiopulmonary, musculoskeletal and dermatological systems, pulmonary function testing, multi-chemistry panel and urinalysis and have been 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 on an **annual** basis 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 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.

7.0 MEDICAL MONITORING PROGRAM

All E/A&H personnel who enter hazardous waste/spill sites or have the potential for exposure to hazardous materials from **these** sites must participate in the E/A&H **Medical Monitoring Program**. The program is conducted by **E/A&H's company** doctor with the company Health and Safety Officer. The purpose of the **program** is to identify any pre-existing **illnesses** or problems **that** would put an employee **at** unusual **risk** from certain exposures or **respirators**, and to monitor and evaluate **exposure-related** events where workers **are** involved in handling hazardous materials. Project managers should consult with the Health and Safety Officer and/or the company doctor concerning the **scope** of work and known or anticipated chemical hazards associated with each project.

E/A&H maintains the right to exclude certain individuals **from** particular **jobs based** on reports from the company doctor. The **program** will be reviewed on an **annual** basis to determine its effectiveness. The company doctor **has** been employed **as** an independent contractor to provide **medical** monitoring for **E/A&H**.

The doctor is responsible for the following aspects of the medical monitoring program:

- Selection and quality assurance of **medical** and **laboratory** services involved in carrying out the monitoring program.
- Development of a uniform medical record.
- Record retention.
- Employee notification of examination results.
- **Determination** of content of the medical and biological monitoring programs.
- Record review and **correlation between** potential exposure and effect.
- **Monitoring** job related illness and injury for each employee.

Preplacement Examinations

Each E/A&H employee will be given a preplacement examination to identify any preexisting illness or problem that would put the employee at an unusual risk from certain exposures; to assure that each employee can safely use negative pressure respirators; and to develop a data base to assess any exposure related events detected during periodic medical monitoring. Data accumulation will include variables such as age, sex, race, smoking, prior employment history, and other conditions that might bear upon the occurrence of subsequent events once employment begins.

The preplacement examination includes:

- Occupational history including previous chemical and carcinogenic exposures.
- Medical history including demographic data, family history, personal habits, past medical history and a current symptomatic review of systems.
- Fertility history.
- Physical examination, stressing examination of the neurologic, cardiopulmonary, musculoskeletal and dermatological systems.
- Physiological parameters including blood pressure and visual acuity testing.
- Pulmonary function testing including FVC, FEV1 and FEV 25-75.
- Electrocardiogram.
- PA and lateral chest X-ray.
- A multi-chemistry panel including tests of kidney and liver function.
- Red blood cell cholinesterase.
- Audiogram.

The history, physiological parameters, X-ray, screening tests and laboratory studies will be conducted before the physical examination. After the physical examination, the medical examiner will review the results of the examination and special studies with each employee and facilitate referral for further evaluation of abnormalities detected during this examination. The

Health and Safety Officer will provide each employee with a written summary and detailed results of the examination along with treatment of any job restrictions. Additional medical testing procedures (e.g. ophthalmology/optometric assessment, specialized audiometric testing) may be required at the discretion of E/A&H's attending physician.

Periodic and Exit Examinations

An examination **and** updated occupational *history* will **be** repeated annually and include:

- Updated occupational and medical *history*.
- Physical examination, stressing examination of the neurologic, cardiopulmonary, musculoskeletal and dermatological systems.
- **Pulmonary** function testing including FVC, FEV1 and FEV 25-75.
- Multi-chemistry panel including **tests** of kidney and liver function.
- urinalysis.

The company doctor **will** review the results of **annual** examination and exposure **data**, and request further **tests** or issue **medical** clearances as appropriate. An examination will **also be** administered when **an** employee leaves the company. The company doctor will **be** consulted for the contents of the exam, except when the employee **has** had **an exam** within 6 months or when there **has** been no site **work since the** last examination.

Return-to-Work Examinations

After any job-related injury or illness, a medical examination is required to determine fitness for duty or **to** identify **any** job restrictions. The medical examiner **will** review the results of this back-to-work examination with the Company doctor **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 **requiring medical** attention.

Confidentiality

Medical records **will be** maintained in a confidential manner **so** that only authorized persons will have access **to** the records. The authorized personnel will include medical **staff** of the joint venture **or** contract medical personnel, the individual, the individual's **personal** physician or the individual's designated representative. Upon request, the individual may obtain **a** copy of the medical file, which **will be** provided within **15** days of the receipt of the written request. Information used for research, testing, statistical, or epidemiologic purposes will have all identifying data removed, including the identity of the individual. Any medical information or findings obtained which **do** not affect the individual's job performance will not be made available **to E/A&H to** maintain the patient-physician confidentiality. **Upon** death, retirement, resignation, or other termination of services, the records will be **retained** by **E/A&H** or contracting physician.

8.0 AUTHORIZED PERSONNEL

Personnel anticipated to be on site at various times during site activities include:

- E/A&H Principal-In-Charge — Dr. James Speakman
- E/A&H Task Order Manager — Mr. Henry Beiro
- E/A&H Field Project Manager — Ms. Allison Dennen
- E/A&H Field Geologist — Mr. Scott Ryan
- E/A&H Site Health & Safety Officer — Mr. Doug Petty
- SOUTHDIIV, Engineer-in-Charge — Ms. Linda Martin
- Naval Air Station Pensacola, Florida Site Contact — Mr. Ron Joyner
- Drilling Subcontractor — C.B. Drilling, Inc.
- Soil Gas Subcontractor — Target, Inc.
- Laboratory Subcontractor — CompuChem

8.1 Responsibilities of E/A&H Field Project Manager

The Field Project Manager will direct the site investigation and operation. She has the primary responsibility for assuring that all personnel are aware of:

- Names of personnel and alternates responsible for site safety and health.
- Safety, health and other hazards present on the site.
- Use of personal protection equipment and assuring that the equipment is available.
- Work practices by which the employee can minimize risks from hazards.
- Safe use of engineering controls and equipment on the site.
- Medical surveillance requirements including recognition of symptoms and signs which might indicate over exposure to hazards.
- Site control measures, decontamination procedures, site standard operating procedures and the contingency plan and responses to emergencies including the necessary PPE.

The Field Project Manager is also responsible for assuring that all employees have received at least 40 hours of health and safety instruction, off the site, and actual field experience under the

direct supervision of a trained experienced supervisor. Workers who may be exposed to unique or special **hazards shall be** provided additional training.

The Field **Project** Manager also monitors the performance of personnel to ensure that mandatory health and safety procedures are being performed and corrects any performances that do not comply with the Health and Safety **Plan**. (Copies of **health** and **safety** training **certificates must** be available for review by the E/A&H Project Manager and **SHSO**.)

Additional responsibilities extend to ensuring that **all** field personnel employed on the site are covered by a medical surveillance program as required by **29 CFR 1910.120(f)**:

- Consulting with the Health and Safety Officer and/or other personnel.
- **Preparation** and submittal of any and **all** project **reports**— includes progress, accident, incident, contractual, etc.
- Monitoring personnel decontamination to ensure that **all** personnel **are** complying with the established decontamination procedures.

8.2 Responsibilities of E/A&H Site ~~Health~~ and Safety Officer

- Stopping work in the event of unsafe conditions.
- Assuring **that** a **copy** of the Health and Safety **Plan** is **maintained** onsite during **all** field activities.
- Advising the Field **Project** Manager **on all** health and **safety** related matters involved at the site.
- Directing and ensuring that the safety program is being correctly followed in the field, including the proper use of personal protective and site monitoring equipment.
- **Ensuring** that the field personnel observe the appropriate **work** zones and decontamination procedures.
- Reporting any **safety** violations to the Project Manager.
- Conducting safety briefings during field activities.

The Site Health and Safety Officer will be a person **trained** in safety and industrial hygiene with at least the following **qualifications**: (1) **40 hours OSHA training**, (2) **32 hours of OSHA supervisory training**, and (3) **field experience** in the activity being conducted. After the project **begins**, the Site Health and Safety officer may elect to evaluate actual site conditions and appoint a member of the project **team** to assume the duties of the Site ~~Health~~ and Safety officer.

The person responsible for daily health and **safety** will be **trained** to **use** the **air** monitoring equipment, **interpret** the **data** collected with the instruments, and **be** familiar with symptoms of heat **stress** and cold exposure and the location and **use** of safety equipment onsite. He or she **will also be** familiar with **this** health and **safety** plan.

The following criteria outline when the Site 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 site work schedules only one **shift** will be working. **As** a result, the Site Health and Safety officer will be responsible for the day **shift**. If circumstances **arise** that **require** work during other periods, an alternate Site Health and Safety Officer will be designated.

8.3 Responsibilities of Field Personnel

- **All** personnel going onsite must be thoroughly briefed **on** anticipated **hazards** and trained on equipment **to** be worn, safety procedures **to** be followed, emergency procedures and communications.
- Required respiratory protective devices and clothing must **be worn** by **all** personnel going **into** **areas** designated for wearing protective equipment.
- Personnel must **be** fit-tested before **using** respirators. Fit **testing** is conducted **in** the office **before** employees go onsite. Documentation is kept in a health and safety file. (Section 6.1 lists fit **testing** procedures.)
- **No** facial hair **which** intrudes on the **sealing** surface of **the** respirator is **allowed** on personnel.

- Personnel onsite must use the buddy system when wearing respiratory protective equipment. **As** a minimum, a **third person**, suitably equipped **as a safety backup**, is required during **initial** entries.
- **Visual** contact must be maintained **between** pairs onsite and site safety personnel. Field personnel should **remain** close together to assist each other during emergencies.
- All field personnel should make **use** of their **senses** to alert themselves to potentially dangerous **situations** which they should avoid, e.g., presence of strong and irritating or **nauseating** odors.
- Personnel should practice unfamiliar operations prior to doing the actual procedure in the field.
- Field personnel **shall** be familiar with the physical characteristics of the site, including:
 - wind direction in **relation** to contamination zones
 - accessibility to associates, equipment and vehicles
 - communications
 - **operation zones**
 - site access
 - **nearest** water sources
- The number of personnel and equipment in the contaminated **area** must be kept to a minimum, consistent with effective site operations.
- **procedures** for leaving a contaminated **area** must be planned and implemented **before** going onsite in accordance with the Site Health and **Safety Plan**.
- **All** visitors **to** the job site must comply with the **Health** and Safety Plan procedures. Personal protection equipment **may be** modified for visitors depending on the **situation**. Modifications must **be** approved by the Site **Health** and Safety officer.

9.0 EMERGENCY INFORMATION

All hazardous waste site activities present a potential risk to onsite personnel. When E/A&H goes onsite we will notify emergency responders of the nature of our work. During routine operations, risk is minimized by establishing good work practices, staying alert and using proper personal protective equipment. Unpredictable events such as physical injury, chemical exposure or fire may occur and must be anticipated.

If any situation or unplanned occurrence requires outside or support service, Ron Joyner, NAS Pensacola site contact, will be informed and the appropriate contact from the following list will be made:

Contact	Agency or Organization	Telephone
Ron Joyner	Naval Air Station, Pensacola	(904) 452-4515
Linda Martin	SOUTH DIV Engineer-in-Charge	(803) 743-0574
Law Enforcement	NAS Pensacola Base security	(904) 452-8888
Fire Department	NAS Pensacola	(904) 452-3333
Ambulance Service	NAS Pensacola Dispensary	(904) 452-3333
Poison Control Center		(800) 282-3171
Henry Beiro	EnSafe/Allen & Hoshall 5720 Summer Trees Drive Memphis, TN 38134	(901) 372-7962 BUS. (901) 383-8410 Home
Doug Petty	EnSafe/Allen & Hoshall 5720 Summer Trees Drive Memphis, TN 38134	(901) 372-7962

Linda Martin, SOUTHDIY Engineer-in-Charge will be contacted after appropriate emergency measures have been initiated onsite.

9.1 Site Resources

Cellular telephones will be used for emergency use and communication/coordination with NAS Pensacola. First-aid and eye wash equipment will be available at the work area. An emergency eye wash and shower station is located at the Chemical Tank Farm.

9.2 Emergency Procedures

Conditions which may constitute an emergency include any member of the field crew being involved in an accident or experiencing any adverse effects or symptoms of exposure while onsite or a condition being discovered that suggests the existence of a situation more hazardous than anticipated.

The following emergency procedures should be followed:

- Site work area entrance and exit routes will be planned and emergency escape routes delineated by the Site Health and Safety Officer.
- If any member of the field team experiences any effects or symptoms of exposure while on the scene, the entire field crew will immediately halt work and act according to the instructions provided by the Site Health and Safety Officer.
- For applicable site activities, wind indicators visible to all onsite personnel will be provided by the Site Health and Safety Officer to indicate possible routes for upwind escape.
- The discovery of any conditions that would suggest the existence of a situation more hazardous than anticipated will result in the suspension of work until the Health and Safety officer has evaluated the situation and provided the appropriate instructions to the field team.

- If an accident **occurs**, the Field Project Manager is to complete an accident report form for submittal to the managing **principal-in-charge** of the project.
- If a member of the field crew suffers a **personal** injury, the Site Health and Safety Officer will call **452-3333** (**serious** injury) to alert appropriate emergency response agencies or administer on-site first aid (minor injury) as the situation **dictates**. An Accident Report Form will be completed for any such incident.
- If a member of the field crew suffers a chemical exposure, the affected **areas** should be flushed immediately with copious amounts of clean water, and if the situation dictates, the Site Health and Safety Officer should alert appropriate emergency response agencies, or personally ensure that the exposed individual is transported to the nearest medical treatment facility for prompt treatment. (**See Appendix D** for directions to the emergency medical facility.) An Accident Report **Form** will be completed for any such incident.

Additional information on appropriate chemical exposure treatment **methods** is provided in the **MSDS** in Appendix **B**. Directions to the nearest emergency medical **facility** capable of providing general emergency medical assistance and treating chemical burns are provided in Appendix D.

10.0 FORMS

The following forms will be used in implementing this Health and Safety Plan:

Plan Acceptance Form

Plan Feedback Form

Exposure History Form

The **Plan Acceptance Form** will be filled out by all employees working on the site before site activities begin. The **Plan Feedback Form** will be filled out by the Site Safety Officer and any other onsite employee who wishes to fill one out. The **Exposure History Form** will be completed by both the Field Project Manager and the individual(s) for whom the form is intended. Examples of each form are provided in Appendix E.

All completed forms must be returned to the Task Order Manager at EnSafe/Allen & Hoshall, Memphis, Tennessee.

APPENDIX A

HEALTH AND SAFETY TRAINING CERTIFICATES

G&S SAFETY SERVICES OF TENNESSEE, INC.

ENVIRONMENTAL TRAINING DIVISION
presents this
CERTIFICATE OF COMPLETION

to

HENRY H. BEIRO

for 8 hours of successful participation in

HAZARDOUS WASTE SITE OPERATIONS REFRESHER

this 24th day of APRIL 19 92

this course is part of a series in

HAZARDOUS WASTE MANAGEMENT TRAINING

Harlan T. Forks

Course Instructor

J. V. R.

Director of Training



This certificate is presented to

Allison L. Dennen

for completion of 40 hours
(August 13 to August 17, 1990)
in the General Site Worker Program
designed by:

The Midwest Consortium for Hazardous Waste

Worker training composed of: University of Cincinnati, The Greater Cincinnati Occupational Health Council, University of Illinois, University of Kentucky, Michigan State University, the South East Michigan Committee on Occupational Health, University of Michigan, Murray State University, Purdue University, University of Wisconsin and Lakeshore Technical College.

Program Contents
Hazardous Recognition
Hazard Control
Monitoring
Non-Respiratory Personal Protective Equipment
Respiratory Equipment
Work Practices
Emergency Response
Rights and Responsibilities

A handwritten signature in cursive script, reading 'Steve Pauer'.

Lakeshore Technical College
Hazardous Materials Staff

A handwritten signature in cursive script, reading 'Dennis Ludwig'.

District Director/President

The New England Consortium

(Partially supported by the National Institute of Environmental Health Sciences)

This is to certify that

Scott Ryan

Certificate # 00099

has successfully completed the

**40-Hour Hazardous Waste Site Workers
Basic Health and Safety Course**

on

September 21, 1988

conducted in conjunction with

CONNECTICOSH

MassCOSH

Maine Labor Group on Health

RICOSH

Work Environment Laboratory at the University of Lowell

Signed

Gene Reese

(Course Coordinator)

CERTIFICATE OF ATTENDANCE

**HAZARDOUS WASTE FIELD INVESTIGATION
HEALTH AND SAFETY TRAINING**

40 Hour General Site Worker Training

10 21 Doug Pebty

January 28, 1992

This Course Meets the Requirements of 29 CFR 1910.120(e)

Rick Barlow

Instructor

Rick Barlow

EN SAFE®

Environmental and Safety Designs, Inc.

Certificate of Completion

This certificate was presented to

JEFFERY R. CARTER

for successful completion of the

40-HOUR HEALTH & SAFETY TRAINING COURSE

in accordance with the

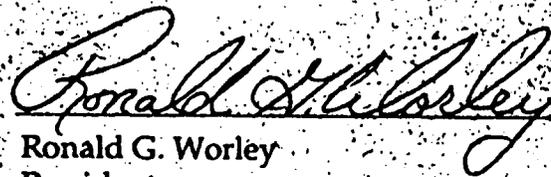
OSHA Hazardous Waste and Emergency Response Operations Standard
(29 CFR 1910.120)

JUNE 11, 1992

Date

40OS41435609108

Certificate number



Ronald G. Worley
President

Ungers & Associates Educational Services, Inc.

CERTIFICATE OF ATTENDANCE

HAZARDOUS WASTE FIELD INVESTIGATION
HEALTH AND SAFETY TRAINING

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APPENDIX B
MATERIAL SAFETY DATA SHEETS

ODOR DESCRIPTION:
100 % ODOR DETECTION:

odor; characteristic odor Source:CHRIS
No data

----- REGULATIONS -----

DOT hazard class: 3 FLAMMABLE LIQUID
DOT guide: 27
Identification number: UN1114
DOT shipping name: Benzene
Packing group: II
Label(s) required: FLAMMABLE LIQUID
Special provisions: T8
Packaging exceptions: 150
Non bulk packaging: 202
Bulk packaging: 242
Quantity limitations-
Passenger air/rail: 5 L
Cargo aircraft only: 60 L
Vessel stowage: B
Other stowage provisions:40

STCC NUMBER: 4908110

CLEAN WATER ACT Sect.307:Yes

CLEAN WATER ACT Sect.311:Yes

National Primary Drinking Water Regulations

Maximum Contaminant Levels (MCL): 0.005 mg/mL»(01/09/89)

Maximum Contaminant Level Goals (MCLG): 0 mg/mL»(01/09/89)

'AN AIR ACT: CAA '90 Listed and CAA '77 Sect 109

WASTE,NUMBER : U019,D018

CERCLA REF: Y

RQ DESIGNATION: A 10 pounds (4.54 kg) CERCLA

SARA TPQ VALUE: Not listed

SARA Sect. 312

categories:

Acute toxicity: Irritant
Acute toxicity: adverse effect to target organs.
Chronic toxicity: carcinogen
Chronic toxicity: mutagen.
Chronic toxicity: reproductive toxin.
Fire hazard: flammable.

LISTED IN SARA Sect 313: Yes

de minimus CONCENTRATION: 0.1 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

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

SHORT TERM TOXICITY: INHALATION: benzene may produce both nerve and blood effects. irritation of the nose, throat and lungs may occur (3,000 ppm may be tolerated for only 30 to 60 minutes). lung congestion may occur. nerve effects may include an exaggerated feeling of well-being, excitement, headache, dizziness and slurred speech. at high levels, slowed breathing and death may result. death has occurred at 20,000 ppm for 5 to 10 minutes, or 7,500 ppm for 30 minutes. SKIN: irritation may occur, with redness and blistering if not promptly removed. benzene is poorly absorbed. whole body exposure for 30 minutes has been reported with no health effects. Eyes: may cause severe irritation. INGESTION: may cause irritation of mouth, throat and stomach. symptoms are similar to those listed under inhalation. one tablespoon may cause collapse, bronchitis, pneumonia and death. (NYDH)

LONG TERM TOXICITY: may cause loss of appetite, nausea, weight loss, fatigue, muscle weakness, headache, dizziness, nervousness and irritability. mild anemia has been reported from exposures of 25 ppm for several years and 100 ppm for 3 months. at levels between 100 and 200 ppm for periods of 6 months, or more, severe irreversible blood changes and damage to liver and heart may occur. temporary partial paralysis has been reported. (NYDH)

TARGET ORGANS: blood, CNS, skin, bone marrow, eyes, resp sys

SYMPTOMS: Dizziness, excitation, pallor, followed by flushing, weakness, headache, breathlessness, chest constriction. Coma and possible death. Source: CHRIS

CONC IDLH: 3000ppm

NIOSH REL: Potential occupational carcinogen 0.1 ppm Time weighted averages for 8-hour exposure 0.32 mg/M3 Time weighted averages for 8-hour exposure 1 ppm Ceiling exposures which shall at no time be exceeded 3.2 mg/M3 Ceiling exposures which shall at no time be exceeded

ACGIH TLV: TLV = 10 ppm Suspected human carcinogen (A2)
ACGIH STEL: Suspected human carcinogen (A2)

OSHA PEL: Final Rule Limits:
TWA = 1 ppm
STEL = 5 ppm
CONSULT 29CFR 1910.1028

MAK INFORMATION: Danger of cutaneous absorption
Carcinogenic working material without MAK
Capable of inducing malignant tumors as shown by
experience with humans.

CARCINOGEN?: Y **STATUS:** See below

REFERENCES:
HUMAN SUSPECTED IARC** 7,203,74
HUMAN SUSPECTED IARC** 28,151,82
ANIMAL SUSPECTED IARC** 28,151,82
ANIMAL SUSPECTED IARC** 29,93,82
HUMAN POSITIVE IARC** 29,93,82
ANIMAL INDEFINITE IARC** 7,203,74

CARCINOGEN LISTS:

IARC: Carcinogen as defined by
IARC as carcinogenic to humans,
with sufficient epidemiological
evidence.
MAK: Capable of inducing malignant
tumors as shown by experience in
humans.
NIOSH: Carcinogen defined by NIOSH
with no further categorization.
NTP: Carcinogen defined by NTP as
known to be carcinogenic, with
evidence from human studies.
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

HUMAN TOXICITY DATA: (Source: NIOSH RTECS)
* ihl-hmn LCLo:2 pph/5M TABIA2 3,231,33
* orl-man LDLo:50 mg/kg YAKUD5 22,883,80
* ihl-hmn LCLo:2000 ppm/5M YAKUD5 22,883,80
ihl-man TCLo:150 ppm/1Y-I BLUTA9 28,293,74
BLOOD
Other changes
NUTRITIONAL AND GROSS METABOLIC
Changes in:
Body temperature increase
ihl-hmn TCLo:100 ppm INMEAF 17,199,48
BEHAVIORAL
Somnolence (general depressed activity)
GASTROINTESTINAL
Nausea or vomiting

SKIN AND APPENDAGES

Skin - after systemic exposure
Dermatitis, other

ihl-hmn LCLo:65 mg/m3/5Y ARGEAR 44,145,74
BLOOD
Other changes

LD50 value: orl-rat LD50:930 mg/ kg

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1991)

orl-rat LD50:930 mg/kg
ihl-rat LC50:10000 ppm/7H
ipr-rat LD50:2890 ug/kg
orl-mus LD50:4700 mg/kg
ihl-mus LC50:9980 ppm
ipr-mus LD50:340 mg/kg
orl-dog LDLo:2 gm/kg
ihl-dog LCLo:146000 mg/m3
ihl-cat LCLo:170000 mg/m3
ihl-rbt LCLo:45000 ppm/30M
ivn-rbt LDLo:88 mg/kg
ipr-gpg LDLo:527 mg/kg
scu-frg LDLo:1400 mg/kg
ihl-mam LCLo:20000 ppm/5M
ipr-mam LDLo:1500 mg/kg

3 TATION DATA: (Source: NIOSH RTECS 1991)

Reproductive toxicity (1991 RTECS):

'This chemical is a mammalian reproductive toxin.

REPRODUCTIVE TOXICITY DATA (1991 RTECS)

ihl-rat TCLo:670 mg/m3/24H (15D pre/1-22D preg) HYSAAV
33(1-3),327,68

EFFECTS ON FERTILITY

Female fertility index

ihl-rat TCLo:56600 ug/m3/24H (1-22D preg) HYSAAV
33(7-9),112,68

EFFECTS ON NEWBORN

ihl-rat TCLo:50 ppm/24H (7-14D preg) JHEMA2 24,363,80

EFFECTS ON EMBRYO OR FETUS

Extra embryonic features(e.g.,placenta,umbilical
cord)

EFFECTS ON EMBRYO OR FETUS

Fetotoxicity(except death,e.g.,stunted fetus)

ihl-rat TCLo:150 ppm/24H (7-14D preg) JHEMA2 24,363,80

EFFECTS ON FERTILITY

Post-implantation mortality

SPECIFIC DEVELOPMENTAL ABNORMALITIES

Musculoskeletal system

orl-mus TDLo:9 gm/kg (6-15D preg) TJADAB 19,41A,79
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)

orl-mus TDLo:12 gm/kg (6-15D preg) TJADAB 19,41A,79
EFFECTS ON FERTILITY
Post-implantation mortality

orl-mus TDLo:6500 mg/kg (8-12D preg) TCMUD8 6,361,86
EFFECTS ON NEWBORN
Growth statistics(e.g.,reduced weight gain)

ihl-mus TCLo:500 ppm/7H (6-15D preg) AIHAAP 40,993,79
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

ihl-mus TCLo:500 mg/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-mus TCLo:5 ppm (6-15D preg) TXCYAC 42,171,86
EFFECTS ON EMBRYO OR FETUS
Cytological changes(including somatic cell genetic material)
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Blood and lymphatic systems(including spleen and marrow)

ihl-mus TCLo:20 ppm/6H (6-15D preg) FAATDF 10,224,88
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Blood and lymphatic systems(including spleen and marrow)

ipr-mus TDLo:5 mg/kg (1D male) TPKVAL 15,30,79
EFFECTS ON FERTILITY
Pre-implantation mortality
EFFECTS ON EMBRYO OR FETUS
Fetal death

scu-mus TDLo:1100 mg/kg (12D preg) TOXID9 1,125,81
EFFECTS ON EMBRYO OR FETUS
Other effects on embryo or fetus

scu-mus TDLo:7030 mg/kg (12-13D preg) SEIJBO 15,47,75
EFFECTS ON EMBRYO OR FETUS
Extra embryonic features(e.g.,placenta,umbilical cord)
EFFECTS ON EMBRYO OR FETUS

Fetotoxicity(except death,e.g.,stunted fetus)
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

ivn-mus TDLo:13200 ug/kg (13-16Dpreg) ICHUDW
4(6),24,82

EFFECTS ON EMBRYO OR FETUS
Cytological changes(including somatic cell genetic
material)

par-mus TDLo:4 gm/kg (12D preg) NEZAAQ 25,438,70
EFFECTS ON NEWBORN

Weaning or lactation index(#alive at weaning per #
alive at day 4)

ihl-rbt TCLo:1 gm/m3/24H (7-20D preg) ATSUDG 8,425,85

EFFECTS ON FERTILITY
Post-implantation mortality

EFFECTS ON FERTILITY

Abortion

EFFECTS ON EMBRYO OR FETUS

Fetal death

NO SIGNIFICANT
RISK LEVEL(Ca P65): 20 micrograms/day

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

PROTECTION SUGGESTED

FROM THE CHRIS MANUAL:

hydrocarbon vapor canister, supplied air or hose mask;
hydrocarbon-insoluble rubber or plastic gloves; chemical goggles or face
splash shield; hydrocarbon-insoluble apron such as neoprene.

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 wash with soap 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)

OSHA (BENZENE)

Less than or equal to 10 ppm: Half-mask air-purifying respirator with
organic vapor cartridge.

More than or equal to 50 ppm: Full facepiece respirator with organic

vapor cartridges. / Full facepiece gas mask with chin style canister.
Less than or equal to 100 ppm: Full facepiece powered air-purifying
respirator with organic vapor canister.

Less than or equal to 1000 ppm: Supplied air respirator with full
facepiece in positive-pressure mode.

Greater than 1000 ppm or Unknown concentration: (1) Self-contained
breathing apparatus with full face-piece in positive pressure mode. (2)
Full facepiece positive-pressure supplied-air respirator with auxiliary
self-contained air supply.

Escape : (1) **Any** organic vapor gas mask; or (2) **Any** self-contained
breathing apparatus with full facepiece.

Firefighting : Any full facepiece self-contained breathing apparatus
operated in positive pressure mode.

FIRST AID SOURCE: NIOSHP

EYE: irr immed

SKIN: soap wash promptly

INHALATION: art resp

INGESTION: no vomit

FIRST AID SOURCE: CHRIS Manual 1991

SKIN: flush with water followed by soap and water; remove contaminated
clothing and wash skin.

EYES: flush with plenty of water until irritation subsides.

INHALATION: remove from exposure immediately. Call a physician. IF
breathing is irregular or stopped, start resuscitation, administer
oxygen.

FIRST AID SOURCE: DOT Emergency Response Guide 1990.

Remove 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: Dry chemical, foam, 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: Benzene

DOT ID NUMBER: UN1114

ERG90

* POTENTIAL HAZARDS *

GUIDE 27

*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 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 direction if tank, rail car or tank truck is involved in fire.
CALL CHEMTREC AT 1-800-424-9300 FOR EMERGENCY ASSISTANCE. 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 of 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 omissions within this database, or in any of its printed or displayed output

ms.

CHEMTOX DATA

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----- IDENTIFIERS -----

CHEMTOX RECORD 398 LAST UPDATE OF THIS RECORD: 06/03/52
 NAME: TOLUENE
 SYNONYMS: TOLUOL; PHENYL METHANE; METHYL BENZENE; BENZENE, METHYL-
 CAS: 108-88-3 RTECS: XS5250000
 FORMULA: C7H8 MOL WT: 92
 WLN: 1R
 CHEMICAL CLASS: Aromatic hydrocarbon

See other identifiers listed below under Regulations.

----- PROPERTIES -----

PHYSICAL DESCRIPTION: colorless watery liquid with a pleasant odor
 BOILING POINT: 383.6 K 110.4 C 230.8 F
 MELTING POINT: 178.00 K -95.2 C -139.3 F
 FLASH POINT: 277.6 K 4.4 C 40 F
 AUTO IGNITION: 809 K 535.8 C 996.5 F
 CRITICAL TEMP: 591.8 K 318.65 C 605.57 F
 CRITICAL PRESS: 4.108 kN/M2 40.5 atm 595 psia
 HEAT OF VAP: 155 Btu/lb 86.08 cal/g 3.601x E5 J/kg
 HEAT OF COMB: -17430 Btu/lb -9690 cal/g -405x E5 J/kg
 VAPOR PRESSURE: 36.7 mm @ 30 C
 : 7.1 %
 : 1.3 %
 IONIZATION POTENTIAL (eV): 8.82
 VAPOR DENSITY: 3.14 (air=1)
 EVAPORATION RATE: 2.00 (n-BUTYL ACETATE=1)
 SPECIFIC GRAVITY: 0.867 @ 20 C
 DENSITY: 0.867
 WATER SOLUBILITY: 0.05%
 INCOMPATIBILITIES: strong ox

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): 40 PPM
 ODOR DESCRIPTION: STRONG, PLEASANT Source NYDH
 100 % ODOR DETECTION: No data

----- REGULATIONS -----

DOT hazard class: 3 FLAMMABLE LIQUID
 hazard guide: 27
 identification number: UN1294

DOT shipping name: Toluene
Packing group: II
Label(s) required: FLAMMAELE LIQUID
Special provisions: T1
Packaging exceptions: 150
Non bulk packaging: 202
Bulk packaging: 242
Quantity limitations-
Passenger air/rail: 5 L
Cargo aircraft only: 60 L
Vessel stowage: B
Other stowage provisions:

STCC NUMBER: 4909305

CLEAN WATER ACT Sect.307:Yes
CLEAN WATER ACT Sect.311:Yes
National Primary Drinking Water Regulations
Maximum Contaminant Levels (MCL) : 1 mg/mL» (07/30/92)
Maximum Contaminant Level Goals (MCLG): 1 mg/mL» (07/30/92)
CLEAN AIR ACT: CAA '90 Listed
EPA WASTE NUMBER: u220
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.

Fire hazard: flammable.

LISTED IN SARA Sect 313: Yes
de minimus CONCENTRATION: 1.0 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): (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

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

SHORT TERM TOXICITY: INHALATION: 100 ppm exposure can cause dizziness, drowsiness and hallucinations. 100-200 ppm can cause depression. 200-500 ppm can cause headaches, nausea, loss of appetite, loss of energy, loss of coordination and coma. in addition to the above, death has resulted from exposure to 10,000 ppm for an unknown time. SKIN: can cause dryness and irritation. absorption may cause or increase the severity of symptoms listed above. Eyes: can cause irritation at 300 ppm. INGESTION: can cause a burning sensation in the mouth and stomach, upper abdominal pain, cough, hoarseness, headache, nausea, loss of appetite, **loss** of energy, loss of coordination and coma. (NYDH)

LONG TERM TOXICITY: levels below 200 ppm may produce headache, tiredness and nausea. from 200 to 750 ppm symptoms may include insomnia, irritability, dizziness, some loss of memory, loss of appetite, a feeling of drunkenness and disturbed menstruation, levels up to 1,500 ppm may cause heart palpitations and loss of coordination. blood effects and anemia have been reported but are probably due to contamination by benzene. most of these effects area believed to go away when exposure stops. (NYDH)

TARGET ORGANS: CNS, liver, kidneys, skin, eyes

SYMPTOMS: Vapors irritate eyes and upper respiratory tract; cause dizziness, headache, anesthesia, respiratory arrest. Liquid irritates eyes and causes drying of skin. If aspirated, causes coughing, gagging, distress, and rapidly developing pulmonary edema. If ingested causes vomiting, griping, diarrhea, depressed respiration. Source: CHRIS

CONC IDLH: 2000ppm

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

ACGIH TLV: TLV = 100 ppm(375 mg/M3)
ACGIH STEL: STEL = 150 ppm(560 mg/M3)

OSHA PEL: Transitional Limits:
PEL = 200 PPM; CEILING = 300 PPM; MAXIMUM PEAK ABOVE CEILING
Final Rule Limits:
TWA = 100 ppm (375 mg/M3)
STEL = 150 ppm(560 mg/M3)

K INFORMATION: 100 ppm
380 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.
Risk of damage to the developing embryo or fetus must be considered probable. Damage cannot be excluded even when the 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-hmn LDLo:50 mg/kg YAKUD5 22,883,80

ihl-hmn TCLo:200 ppm JAMAAP 123,1106,43
BRAIN AND COVERINGS
Recordings from specific areas of CNS
BEHAVIORAL
Antipsychotic
BLOOD
Changes in bone marrow not included above

50 value: orl-rat LD50:636 mg/ kg

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1991)

orl-rat LD50:636 mg/kg
ihl-rat LC50:>26700 ppm/1H
ipr-rat LD50:1332 mg/kg
ivn-rat LD50:1960 mg/kg
unr-rat LD50:6900 mg/kg
ihl-mus LC50:400 ppm/24H
ipr-mus LD50:59 mg/kg
scu-mus LD50:2250 mg/kg
unr-mus LD50:2000 mg/kg
ihl-rbt LCLo:55000 ppm/40M
skn-rbt LD50:12124 mg/kg
ivn-rbt LDLo:130 mg/kg
ihl-gpg LCLo:1600 ppm
ipr-gpg LD50:500 mg/kg
scu-frg LDLo:920 mg/kg
ipr-mam LDLo:1750 mg/kg

IRRITATION DATA: (Source: NIOSH RTECS 1991)

Reproductive toxicity (1991 RTECS):

This chemical is a mammalian reproductive toxin.

REPRODUCTIVE TOXICITY DATA (1991 RTECS)

ihl-rat TCLo:1500 mg/m³/24H (1-8D preg) TXCYAC 11,55,78
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

ihl-rat TCLo:1000 mg/m³/24H (7-14D preg) FMORAO
28,286,80
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

ihl-rat TCLo:100 ppm (51W male) SAIGBL 13,501,71
PATERNAL EFFECTS
Testes,epididymis,sperm duct

orl-mus TDLo:9 gm/kg (6-15D preg) TJADAB 19,41A,79
EFFECTS ON EMBRYO OR FETUS
Fetal death

orl-mus TDLo:15 gm/kg (6-15D preg) TJADAB 19,41A,79
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)

orl-mus TDLo:30 gm/kg (6-15D preg) TJADAB 19,41A,79
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Craniofacial(including nose and tongue)

ihl-mus TCLo:500 mg/m³/24H (6-13D preg) TXCYAC 11,55,78
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)

ihl-mus TCLo:1000 ppm/6H (2-17D preg) TJEMDR 7,265,82
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

ihl-mus TCLo:400 ppm/7H (7-16D preg) FAATDF 6,145,86
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system
EFFECTS ON NEWBORN

ihl-mus TCLo:200 ppm/7H (7-16D preg) FAATDF 6,145,86
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Urogenital system

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

PROTECTION SUGGESTED
FROM THE CHRIS MANUAL:

OSHA 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 (TOLUENE)

1000 ppm: Any chemical cartridge 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** powered air-purifying respirator with organic vapor cartridge(s). * 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.
2000 ppm: Any supplied-air respirator operated in a continuous flow mode. * Substance reported to cause eye irritation or damage may require eye protection. / **Any** self-contained breathing apparatus with a full facepiece. / Any supplied-air respirator with a full facepiece. / Any air-purifying full facepiece respirator (gas mask) with a chin-style or front- or back-mounted organic vapor canister.

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: CHRIS Manual 1991

INHALATION: remove to fresh air, give artificial respiration and oxygen if needed; call a doctor.

INGESTION: do NOT induce vomiting; call a doctor.

EYES: flush with water for at least 15 min.

SKIN: wipe off, 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: Carbon dioxide or dry chemical for small fires, ordinary foam for large fires. Note: Water may be ineffective CHRIS91

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

DOT SHIPPING NAME: Toluene

DOT ID NUMBER: UN1294

ERG90

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.

*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 direction if tank, rail car or tank truck is involved in fire.

CALL CHEMTREC AT 1-800-424-9300 FOR EMERGENCY ASSISTANCE. 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 of venting safety device or any discoloration of tank due to fire.

*PILL 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.

Packaging exceptions: None■None■153
Non bulk packaging: 211■212■203
Bulk packaging: ~~202,202,201~~
Quantity limitations-
Passenger air/rail: 5 kg■25 kg■100 kg
Cargo aircraft only: 50 kg■100 kg■200 kg
Vessel stowage: A■A■A
Other stowage provisions: 52, M2■52, M2■52, M2

STCC NUMBER: Not listed

CLEAN WATER ACT Sect.307:Yes
CLEAN WATER ACT Sect.311:No
CLEAN AIR ACT: CAA '90 By category
EPA WASTE NUMBER: P030
CERCLA REF: Y
RQ DESIGNATION: A 10 pounds (4.54 kg) CERCLA
SARA TPQ VALUE: Not listed
SARA Sect. 312
categories:

Acute toxicity: Highly toxic. LD50 is 50 mg/kg
or less (oral rat).

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

UNITED STATES POSTAL SERVICE MAILABILITY:

Hazard class: Poison, Class B - Mailable as ORM-D
Mailability: Domestic service and air transportation shipper's declaration
Weight per parcel: 8 OZ

NFPA CODES:

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

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

SHORT TERM TOXICITY: HEADACHE, WEAKNESS, DEATH, UNCONCIOUSNESS, EYE AND
SKIN IRRITATION. ** Source: 12, 2.

LONG TERM TOXICITY: rare or nonexistant goiter. ** source: 12

TARGET ORGANS:

SYMPTOMS : Source:

CONC IDLH: 50mg/M3

NIOSH REL: 4.7 ppm Ceiling exposures which shall at no time be
exceeded (10-MINI 5 mg/M3 Ceiling exposures which
shall at no time be exceeded (10-MIN)

ACGIH TLV: TLV = 5 mg/M3 as CYANIDE - SKIN
ACGIH STEL: as CYANIDE - SKIN

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

MAK INFORMATION: 75 ppm
200 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

LD50 value: No LD50 in RTECS 1992

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1991)
i pr-mus LD50:3 mg/kg

● CITATION DATA: (Source: NIOSH RTECS 1991)

Reproductive toxicity (1991 RTECS):
This chemical has no known mammalian reproductive toxicity.

REPRODUCTIVE TOXICITY DATA (1991 RTECS)

----- 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. Remove and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature. Effects may be delayed; keep victim under observation.

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

NET SHIPPING NAME: Cyanides, inorganic, n.o.s.
ID NUMBER: UN1588

ERG90

GUIDE 55

* POTENTIAL HAZARDS *

***HEALTH HAZARDS**

Poisonous; may be fatal if inhaled, swallowed or absorbed through skin.
Contact may cause burns to skin and eyes through skin.

Runoff from fire control or dilution water may give off poisonous **gases**
and cause water pollution.

Fire may produce irritating or poisonous gases.

***FIRE OR EXPLOSION**

Some of these materials may burn, but none of them ignites readily.
Container may explode violently 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 chemical
protective clothing which is specifically recommended by the shipper
or manufacturer may be worn. It may provide little or no thermal
protection.

Structural firefighter's protective clothing is not effective for these
materials.

Remove and isolate contaminated clothing at the site.

CALL CHEMTREC AT 1-800-424-9300 AS SOON AS POSSIBLE, especially if there
is no local hazardous materials team available.

***FIRE**

Small Fires: Drychemical, 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.

Fight fire from maximum distance. Stay away from ends of tanks.

Dike fire control water for later disposal; do not scatter the material.

***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 vapors.

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; move containers from spill area.

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 or eyes with
running water for at least 15 minutes.

Speed in removing material from skin is of extreme importance.
Remove and isolate contaminated clothing and shoes at the site.
Keep victim quiet and maintain normal body temperature.
Effects may be delayed; keep victim under observation.

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----- IDENTIFIERS -----

CHEMTOX RECORD 2203 LAST UPDATE OF THIS RECORD: 06/03/92
 NAME: 0-DICHLOROBENZENE
 SYNONYMS: BENZENE, 1,2-DICHLORO-; CHLOROBEN; CHLORODEN; CLOROBEN;
 DCB; o-DICHLOROBENZENE; o-DICHLOR BENZOL;
 o-DICHLOROBENZENE; 1,2-DICHLOROBENZENE; DICHLOROBENZENE,
 ORTHO, LIQUID; DILANTIN DB; DILATIN DB; DIZENE; DOWTHERM
 E; NCI-C54944; ODB; ODCB; ORTHODICHLOROBENZENE;
 ORTHODICHLOROBENZOL; SPECIAL TERMITE FLUID; TERMITKIL;
 O-DICHLOROBENZOL; 0-DICHLOROBENZENE
 CAS: 95-50-1 RTECS: C2450000
 FORMULA: C6H4Cl2 MOL WT: 147
 WLN: GR BG
 CHEMICAL CLASS: ST

See other identifiers listed below under Regulations.

----- PROPERTIES -----

PHYSICAL DESCRIPTION: colorless to pale yellow liquid with a pleasant,
 aromatic odor

BOILING POINT:	453.5 K	180.3 C	356.6 F
Z I N G POINT:	256.00 K	-17.2 C	1.1 F
H POINT:	339 K	65.8 C	150.5 F
IGNITION:	920.92 K	647.7 C	1197.9 F
VAPOR PRESSURE:	1mm @ 20 C		
UEL:	9.2 %		
LBL:	2.2 %		
IONIZATION POTENTIAL (eV):	9.06		
VAPOR DENSITY:	5.05 (air=1)		
EVAPORATION RATE:	0.165 (n-BUTYL ACETATE=1)		
SPECIFIC GRAVITY:	1.3059 @ 20 C		
DENSITY:	1.307 @ 20C		
WATER SOLUBILITY:	0.015%		
INCOMPATIBILITIES:	strong oxidizers hot aluminum or aluminum alloys		

REACTIVITY WITH WATER: PRACTICALLY INSOLUBLE IN WATER Source:
 MI

REACTIVITY WITH COMMON MATERIALS: MISCIBLE WITH ALCOHOL, ETHER, BENZENE
 Source: MI

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): 50 ppm

ODOR DESCRIPTION: Aromatic; characteristic Source: CHRIS

* ODOR DETECTION: No data

----- REGULATIONS -----

hazard class: 6.1 POISON
 guide: 58
 Identification number: UN1591
 DOT shipping name: o-DICHLOROENZENE
 Packing group: III
 Label(s) required: KEEP AWAY FROM FOOD
 Special provisions: T7
 Packaging exceptions: 153
 Non bulk packaging: 203
 Bulk packaging: 241
 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:Yes

CLEAN WATER ACT Sect.311:No

National Primary Drinking Water Regulations

Maximum Contaminant Levels (MCL) : 0.6 mg/mL* (07/30/92)

Maximum Contaminant Level Goals (MCLG): 0.6 mg/mL* (07/30/92)

CLEAN AIR ACT: Not listed

FPA WASTE NUMBER: U070

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.

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-A

Mailability: Domestic service and air transportation; shipper's declaratioc

Max per parcel: 70 LBS; 1 PT

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

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

SHORT TERM TOXICITY: INHALATION: levels of **50** ppm and above have caused irritation to the nose and eyes. higher, unknown levels have caused headache, nausea, vomiting, drowsiness, incoordination, unconsciousness and death. in animal studies, nerve, liver and kidney damage was also noticed. SKIN: may cause irritation, reddening, swelling and sores in sensitive individuals. Eyes: may cause irritation and cataracts. INGESTION: may cause symptoms similar to inhalation.(NYDH)

LONG TERM TOXICITY: prolonged or repeated exposures may cause skin burns, **blood** changes and injury to the liver, kidney and lungs.(NYDH)

TARGET ORGANS: skin, eyes, mucous membranes, liver, kidney, CNS

SYMPTOMS: Chronic inhalation of mist or vapors may result in damage to lungs, liver, and kidneys. Acute vapor exposure can cause symptoms ranging from coughing to central nervous system depression and transient anesthesia. Irritating to skin, eyes, and mucous membranes. May cause dermatitis. Source: CHRIS

CONC IDLH: 1000ppm

OSHA REL:

ACGIH TLV: TLV = 50 ppm CEILING - SKIN
ACGIH STEL: CEILING - SKIN

OSHA PEL: Transitional Limits:
PEL = (C) 50 ppm ((C) 300mg/M3)
Final Rule Limits:
CEILING = 50 ppm (300 mg/M3)

MAX INFORMATION: **50** ppm
300 mg/M3
Substance with systemic effects, onset of effect less than or equal to 2 **hrs:** Peak = 2x**MAX** for 30 minutes, 4 times per shift of **8** hours.
Danger of cutaneous absorption
There is no reason to fear a risk of damage to the developing embryo or fetus when **MAX** values are adhered to.

CARCINOGEN? : N **STATUS:** **See** below
REFERENCES :
HUMAN INDEFINITE IARC** 7,231,74
ANIMAL INDEFINITE IARC** 7,231,74
HUMAN INDEFINITE IARC** 29,213,82

CARCINOGEN LISTS:

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

LD50 value: orl-rat LD50:500 mg/ kg

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1991)

orl-rat LD50 :500 mg/kg
ihl-rat LCLo:821 ppm/7H
ipr-rat LD50 :840 mg/kg
scu-rat LD50:5 gm/kg
orl-mus LD50:4386 mg/kg
ipr-mus LD50:1228 mg/kg
ivn-mus LDLo:400 mg/kg
orl-rbt LD50 :500 mg/kg
ivn-rbt LDLo:250 mg/kg
orl-gpg LDLo:2 gm/kg
ihl-gpg LCLo:800 ppm/24H

IRRITATION DATA: (Source: NIOSH RTECS 1991)

eye-rbt 100 mg/30S rns MLD

Reproductive toxicity (1991 RTECS):

This chemical is a mammalian reproductive toxin.

REPRODUCTIVE TOXICITY DATA (1991 RTECS)

ihl-rat TCLo:200 ppm/6H (6-15D preg) FAATDF 5,190,85
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

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

PROTECTION SUGGESTED
FROM THE CHRIS MANUAL:

organic vapor-acid gas respirator; neoprene or vinyl gloves; chemical
safety spectacles, face shield, rubber footwear, apron, 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 contaminated.

REMOVE CLOTHING:

Promptly remove non-impervious clothing that becomes contaminated.

** REFERENCE: NIOSH

RECOMMENDED RESPIRATION PROTECTION Source: NIOSH POCKET GUIDE (85-114)
OSHA (0-DICHLOROBENZENE)

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).

1250 ppm: Any supplied-air respirator operated in a continuous flow mode. * Substance causes eye irritation or damage; eye protection needed.

1700 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: remove victim to fresh air, keep him quiet and warm, and call a physician promptly.

INGESTION: no known antidote; treat symptomatically; induce vomiting and get medical attention promptly.

EYES AND

SKIN: flush with plenty of water; get medical attention for eyes; remove contaminated clothing and wash before reuse.

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. Effects should disappear after individual has been exposed to fresh air for approximately 10 minutes.

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

FIRE EXTINGUISHMENT: Water, foam, dry chemical, or carbon dioxide. CHRIS91

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

1 SHIPPING NAME: o-DICHLOROBENZENE

* POTENTIAL HAZARDS •

*HEALTH HAZARDS

Inhalation of vapor or dust is extremely irritating

May cause burning of eyes and flow of tears.

May cause coughing, difficult breathing and nausea.

Brief exposure effects last only a few minutes.

Exposure in an enclosed area may be very harmful.

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, 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 shipper or manufacturer may be worn. It may provide little or no thermal protection.

Structural firefighter's protective clothing is not effective for these materials.

CALL CHEMTREC AT 1-800-424-9300 FOR EMERGENCY ASSISTANCE. 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.

*SPILL OR LEAK

Do not touch 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.

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 or eyes with running water for at least 15 minutes.

Remove and isolate contaminated clothing and shoes at the site.

Effects should disappear after individual has been exposed to fresh air for approximately 10 minutes.

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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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----- IDENTIFIERS -----

CHEMTOX RECORD 3276 LAST UPDATE OF THIS RECORD: 06/03/92
 NAME: BENZENE, 1,3-DICHLORO-
 SYNONYMS: 1,DICHLOROBENZENE; M-DICHLOROBENZENE
 CAS: 541-73-1 RTECS: CZ4499000
 FORMULA: C6H4Cl2 MOL WT: 147.02
 WLN:
 CHEMICAL CLASS:Halogenated h-carbon; Aromatic hydrocarbon

See other identifiers listed below under Regulations.

----- PROPERTIES -----

PHYSICAL DESCRIPTION: colorless liquid; soluble in alcohol, ether
 BOILING POINT: 445.15 K 172 C 341.6 F
 MELTING POINT: 249.15 K -24 C -11.2 F
 FLASH POINT: 336.15 K 63 C 145.4 F
 AUTO IGNITION: NA
 VAPOR PRESSURE:
 UEL: NA
 LEL: NA
 VAPOR DENSITY: No data
 SPECIFIC GRAVITY: 1.2884 @ 20 C
 DENSITY: 1.29 g/mL
 WATER SOLUBILITY: INSOLUBLE
 COMPATIBILITIES:

REACTIVITY WITH WATER: No data on water reactivity
 REACTIVITY WITH COMMON MATERIALS:REACTS WITH OXIDIZERS AND ALUMINUM
 Source: CSDS
 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: COMBUSTIBLE LIQUID
 DOT guide:
 Identification number: NA1993
 DOT shipping name: COMBUSTIBLE LIQUID, N.O.S.
 Packing group: III
 Label(s) required: NONE
 Special provisions: T1
 Packaging exceptions: 150

Non bulk packaging: 203
Bulk packaging: 241
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:Yes

CLEAN WATER ACT Sect.311:No

CLEAN AIR ACT: Not listed

EPA WASTE NUMBER: U071

CERCLA REF: Not listed

RQ DESIGNATION: B 100 pounds (45.4 kg) CERCLA

SARA TPQ VALUE: Not listed

SARA Sect. 312

categories:

Acute toxicity: adverse effect to target organs.

Chronic toxicity: mutagen.

LISTED IN SARA Sect 313: Yes

de minimus CONCENTRATION: 1.0 percent

UNITED STATES POSTAL SERVICE MAILABILITY:

Not given

HAZARD CODES:

HEALTH HAZARD (BLUE): (3) Extremely hazardous to health. Full protection required. No skin surface should be exposed.

FLAMMABILITY (RED) : (2) This material must be moderately heated before ignition will occur.

REACTIVITY (YELLOW): (0) Stable even under fire conditions.

SPECIAL : Unspecified

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

SHORT TERM TOXICITY: Unknown

LONG TERM TOXICITY: liver damage ** source: hcdb

TARGET ORGANS: severe eye and skin irritation

SYMPTOMS : EYE, SKIN AND MUCOUS MEMBRANE IRRITATION, HEADACHE, DROWSINESS, AND UNSTEADINESS. Source:

CONC IDLH: Unknown

NIOSH REL: Not given

OSHA PEL TLV: Not listed

ACGIH STEL: Not listed
OSHA PEL: Not in Table Z-1-A
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: No LD50 in RTECS 1992

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1991)

ipr-mus LD50:1062 mg/kg

IRRITATION DATA: (Source: NIOSH RTECS 1991)

Reproductive toxicity (1991 RTECS):

This chemical has no known mammalian reproductive toxicity.

REPRODUCTIVE TOXICITY DATA (1991 RTECS)

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

PROTECTION SUGGESTED
FROM THE CHRIS MANUAL:

..... 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. 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.

----- IDENTIFIERS -----

CHEMTOX RECORD 2204

LAST UPDATE OF THIS RECORD: 06/03/92

NAME: p-DICHLOROBENZENE
 SYNONYMS: p-CHLOROPHENYL CHLORIDE; p-DICHLOROBENZEEN (Dutch);
 1,4-DICHLOROBENZEEN (Dutch); p-DICHLOROBENZOL (German);
 1,4-DICHLOR-BENZOL (German); DI-CHLORICIDE;
 p-DICHLOROBENZENE; 1,4-DICHLOROBENZENE; p-DICHLOROBENZOL;
 DICHLOROBENZENE, PARA, SOLID; 1,4-DICHLOROBENZENE
 (Italian); p-DICHLOROBENZENE (Italian); EVOLA; NCI-C54955;
 PARACIDE; PARA CRYSTALS; PARADI; PARADICHLOROBENZENE;
 PARADICHLOROBENZOL; PARADOW; PARAMOTH; PARANUGGETS;
 PARAZENE; PDB; PDCB; PERSIA-PERAZOL; SANTOCHLOR; BENZENE,
 1,4-DICHLORO-; DICHLOROCIDE; ;
 CAS : 106-46-7 RTECS : CZ4550000
 FORMULA: C6H4Cl2 MOL WT: 147.00
 WLN : GR DG
 CHEMICAL CLASS: TT

See other identifiers listed below under Regulations.

----- PROPERTIES -----

PHYSICAL DESCRIPTION: colorless to white crystals with a mothball-like odor
 BOILING POINT: 447.04 K 173.8 C 345 F
 MELTING POINT: 325.93 K 52.7 C 127 F
 FLASH POINT: 338 K 64.8 C 148.7 F
 AUTO IGNITION: NA
 VAPOR PRESSURE: 0.4mm @ 25 C
 UEL: NA
 LEL: NA
 IONIZATION POTENTIAL (eV) : 8.94
 VAPOR DENSITY: 5.08 (air-1)
 SPECIFIC GRAVITY: 1.458 20C
 DENSITY: 1.4581 g/mL @ 20.5 C
 WATER SOLUBILITY: 0.008%
 INCOMPATIBILITIES: none hazardous

REACTIVITY WITH WATER: PRACTICALLY INSOLUBLE Source: MI
 REACTIVITY WITH COMMON MATERIALS: CAN REACT VIGOROUSLY WITH OXIDIZING
 MATERIALS; SOLUBLE IN ALCOHOL, ETHER,
 BENZENE, CHLOROFORM, CARBON DISULFIDE
 Source: MI

STABILITY DURING TRANSPORT: No Data
 NEUTRALIZING AGENTS : No data
 POLYMERIZATION POSSIBILITIES: No data

TOXIC FIRE GASES: TOXIC DECOMPOSITION GASES
 ODOR DETECTED AT (ppm): 15-30 ppm
 ODOR DESCRIPTION: Aromatic (like mothballs) Source: CHRIS
 0 % ODOR DETECTION: No data

----- REGULATIONS -----

hazard class: 6.1 POISON
guide: 58
Identification number: UN1592
DOT shipping name: p-Dichlorobenzene
Packing group: III
Label(s) required: KEEP AWAY FROM FOOD
Special provisions:
Packaging exceptions: 153
Non bulk packaging: 213
Bulk packaging: 240
Quantity limitations-
Passenger air/rail: 100 kg
Cargo aircraft only: 200 kg
Vessel stowage: A
Other stowage provisions: 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): 0.075 mg/mL (01/09/89)

Maximum Contaminant Level Goals (MCLG): 0.075 mg/mL (01/09/89)

CLEAN AIR ACT: CAA '90 Listed

TPA WASTE NUMBER: U072, D027

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.
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 declaratic

Max per parcel: 70 LBS; 5 LBS

NFPA CODES:

HEALTH HAZARD (BLUE): Unspecified

FLAMMABILITY (RED): Unspecified

REACTIVITY (YELLOW): Unspecified

SPECIAL: Unspecified

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

e **TERM TOXICITY:** **INHALATION:** sudden high exposures (80 ppm - 160 ppm) to dust or fumes can cause headache, dizziness and hyperactivity. continued inhalation may lead to nose, throat and lung irritation and congestion. liver and kidney damage from continued episodes of short term exposure can develop but are reversible if exposure is discontinued. exposure to concentrations over 160 ppm are unbreathable and extremely irritating to nose and throat. **SKIN:** solid para-dichlorobenzene has a negligible irritating action on uncovered skin. warm fumes or strong solutions may cause irritation of skin but exposure has to be for a prolonged period and at high concentrations. presents no hazard from absorption through skin. **Eyes:** exposures to particle or vapor concentrations of **50** to 80 ppm may cause extreme irritation, pain and excessive tearing. **INGESTION:** nausea, vomiting, stomach pain and diarrhea may occur rapidly. liver and kidney damage is likely but usually disappear once exposure is stopped. (NYDH)

LONG TERM TOXICITY: exposure to levels above **45** ppm over an **8** hour period has led to irritation of the eyes and nose. exposure to fumes for prolonged periods of time can result in weakness, dizziness, possibly vomiting and weight loss. liver damage **may** develop. lung irritation from the fume can give rise to lung congestion, cough and shallow breathing. (NYDH)

TARGET ORGANS: liver, respiratory system, eyes, kidneys, skin. >>2

SYMPTOMS: **INHALATION:** irritation of upper respiratory tract; over- exposure may cause depression and injury to liver and kidney. **EYE CONTACT:** pain and mild irritation. Source: CHRIS

CONC IDLH: 100OPPM

NIOSH REL: Potential occupational carcinogen

ACGIH TLV: TLV = 75 ppm
ACGIH STEL: STEL = 110 ppm

OSHA PEL: Transitional Limits:
PEL = 75 ppm (450mg/M3)
Final Rule Limits:
TWA = 75 ppm (450 mg/M3)
STEL = 110 ppm (675 mg/M3)

MAK INFORMATION: 75 ppm
450 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.
There is no reason to fear a risk of damage to the developing embryo or fetus when MAK values are adhered to.

CARCINOGEN?: Y STATUS: See below

REFERENCES:
HUMAN INDEFINITE IARC** 7,231,74
ANIMAL INDEFINITE IARC** 7,231,74
HUMAN INDEFINITE IARC** 29,213,82

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: Carcinogen defined by NTP as reasonably anticipated to be carcinogenic, with limited evidence in humans or sufficient evidence in experimental animals.
ACGIH: Not listed
OSHA: Not listed

TOXICITY DATA: (Source: NIOSH RTECS)

orl-hmn TDLo:300 mg/kg PCOC** -,851,66
SENSE ORGANS
Eye
Other
LUNGS, THORAX, OR RESPIRATION
Other changes
GASTROINTESTINAL
Hypermotility,diarrhea
* orl-hmn LDLo:857 mg/kg 34ZIAG -,210,69
* unr-hmn LDLo:357 mg/kg YKYUA6 31,1499,80

LD50 value: orl-rat LD50:500 mg/ kg

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1991)

orl-rat LD50:500 mg/kg
skn-rat LD50:>6 gm/kg
ipr-rat LD50:2562 mg/kg
orl-mus LD50:2950 mg/kg
ipr-mus LD50:2 gm/kg
scu-mus LD50:5145 mg/kg
orl-rbt LD50:2830 mg/kg
skn-rbt LD50:>2 gm/kg

IRRITATION DATA: (Source: NIOSH RTECS 1991)

eye-hmn 80 ppm

4 reproductive toxicity (1991 RTECS):
This chemical is a mammalian reproductive toxin.

REPRODUCTIVE TOXICITY DATA (1991 RTECS)
orl-rat TDLo:7500 mg/kg (6-15D preg) BECTA6 37,164,86
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

orl-rat TDLo:10 gm/kg (6-15D preg) BECTA6 37,164,86
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)

NO SIGNIFICANT
RISK LEVEL(Ca P65): 20 micrograms/day

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

PROTECTION SUGGESTED
FROM THE CHRIS MANUAL:
full face mask fitted with organic vapor canister for concentrations over
75 ppm; clean protective clothing; eye protection.

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 when there was a reasonable probability of co

** REFERENCE: NIOSH

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

1000 ppm: Any supplied-air respirator operated in a continuous flow
mode. * Substance causes eye irritation or damage; eye protection needed.
/ 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). / Any supplied-air respirator with a full facepiece. / Any
self-contained breathing apparatus 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.

CAPE Any air-purifying full facepiece respirator (gas mask) with a
n-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 any ill effects develop, remove patient to fresh air and medical attention. If breathing stops, give artificial respiration.

EYES: flush with plenty of water and get medical attention if ill effects develop.

SKIN AND

INGESTION: no problem likely.

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. Effects should disappear after individual has been exposed to fresh air for approximately 10 minutes.

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

FIRE EXTINGUISHMENT: Water, foam, carbon dioxide or **dry** chemical. CHRIS91

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

DOT SHIPPING NAME: p-Dichlorobenzene

DOT ID NUMBER: UN1592

WG58

GUIDE 58

* POTENTIAL HAZARDS *

*HEALTH HAZARDS

Inhalation of vapor or dust is extremely irritating
May cause burning of eyes and flow of tears.
May cause coughing, difficult breathing and nausea.
Brief exposure effects last only a few minutes.
Exposure in an enclosed area may be very harmful.
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, 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 shipper or manufacturer may be worn. It may provide little or no thermal protection.
Structural firefighter's protective clothing is not effective for these materials.
CALL CHEMTREC AT 1-800-424-9300 FOR EMERGENCY ASSISTANCE. 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.

*SPILL OR LEAK

Do not touch 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.

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 or eyes with running water for at least 15 minutes.

Remove and isolate contaminated clothing and shoes at the site.

Effects should disappear after individual has been exposed to fresh air for approximately 10 minutes.

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----- IDENTIFIERS -----

CHEMTOX RECORD **2047** LAST UPDATE OF THIS RECORD: 06/03/92
 NAME: SODIUM
 SYNONYMS: NATRIUM; SODIUM METAL (DOT)
 CAS: **7440-23-5** RTECS: **VY0686000**
 FORMULA: Na MOL WT: **22.99**
 WLN: .NA
 CHEMICAL CLASS: Metal

See other identifiers listed below under Regulations.

----- PROPERTIES -----

PHYSICAL DESCRIPTION: soft metal, solvery when freshly cut, tarnishes rapidly to gray color. reacts violently with water producing hydrogen gas. sufficient heat is evolved to ignite the hydrogen in air.

BOILING POINT:	1154.4 K	881.2 C	1618.2 F
MELTING POINT:	370.8 K	97.6 C	207.7 F
FLASH POINT:	NA		
AUTO IGNITION:	394 K	120.8 C	249.5 F
VAPOR PRESSURE:	NA		
REFL:	NA		
OR DENSITY:	No data		
SPECIFIC GRAVITY:	No data		
DENSITY:	0.97 @ 20C		
WATER SOLUBILITY:	REACTS EXPL		
INCOMPATIBILITIES:	water acids alcohols halogens strong OX		

REACTIVITY WITH WATER: REACTS VIOLENTLY TO FORM FLAMMABLE HYDROGEN GAS **AND** A STRONG CAUSTIC SOLUTION. SUFFICIENT HEAT EVOLVED TO AUTOIGNITE THE HYDROGEN-AIR MIXTURE.

REACTIVITY WITH COMMON MATERIALS: MAY IGNITE COMBUSTIBLE MATERIALS IF **THEY ARE DAMP.**

STABILITY DURING TRANSPORT: STABLE, IF PROTECTED FROM AIR AND MOISTURE.

NEUTRALIZING AGENTS: CAUSTIC FORMED BY REACTION WITH WATER **SHOULD BE FLUSHED WITH WATER, THEN AREA CAN BE RINSED WITH DILUTE ACETIC ACID.**

POLYMERIZATION POSSIBILITIES: No data

TOXIC FIRE GASES: None reported other than possible unburned vapors

ODOR DETECTED AT (ppm): Unknown

ODOR DESCRIPTION: No data

ODOR DETECTION: No data

----- REGULATIONS -----

DOT hazard class: 4.3 DANGEROUS WHEN WET
Hazard guide: 40
Identification number: UN1428
DOT shipping name: Sodium
Packing group: II
Label(s) required: DANGEROUS WHEN WET
Special provisions: A7, A8, A19, A20, B9, B68, N34, T15, T29
Packaging exceptions: None
Non bulk packaging: 212
Bulk packaging: 244
Quantity limitations-
Passenger air/rail: Forbidden
Cargo aircraft only: 50 kg
Vessel stowage: D
Other stowage provisions:

STCC NUMBER: 4916456

CLEAN WATER ACT Sect.307:No
CLEAN WATER ACT Sect.311:Yes
CLEAN AIR ACT: Not listed
EPA WASTE NUMBER: None
CERCLA REF: Y
RQ DESIGNATION: A 10 pounds (4.54 kg) CERCLA
SARA TPQ VALUE: Not listed
SARA Sect. 312

categories:

Fire hazard: flammable.
Acute toxicity: adverse effect to target organs.
Reactive hazard: water reactive.

UNITED STATES POSTAL SERVICE MAILABILITY:

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

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): (2) Normally unstable and readily undergoes violent change, but does not detonate.
SPECIAL : Water reactive.

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

SHORT TERM TOXICITY: INHALATION: contact with water, including perspiration, causes the formation of sodium hydroxide fumes which are highly irritating to skin, eyes, nose and throat. may cause sneezing and coughing. very

severe exposures may result in difficult breathing, coughing, and chemical bronchitis. **SKIN:** contact **may** cause itching, tingling, thermal and caustic burns and may cause permanent damage. **Eyes:** **may** cause very painful irritation and tearing. contact with eyes may result in permanent damage and loss of sight. **INGESTION:** causes immediate intense burning sensation in mouth, throat and stomach, followed by salivation, vomiting, rapid breathing, symptoms of shock, diarrhea, loss of consciousness and death. (NYDH)

LONG TERM TOXICITY: no long term effects are known. (NYDH)

TARGET ORGANS: skin, eyes, lungs (as caustic vapors)

SYMPTOMS: SEVERLY IRRITATES SKIN, EYES AND MUCOUS MEMBRANES.
TOXICITY: HIGHLY TOXIC BY SKIN CONTACT, INGESTION, AND INHALATION. THE FUME RELEASED WHEN INVOLVED IN FIRE IS ALSO HIGHLY TOXIC. Source: THIC

CONC IDLH: Unknown

NIOSH REL: Not given

ACGIH TLV: Not listed

ACGIH STEL: Not listed

OSHA PEL: Not in Table Z-1-A

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: No **LD50** in RTECS 1992

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1991)

ipr-mus LD50: 4 gm/kg

IRRITATION DATA: (Source: NIOSH RTECS 1991)

Reproductive toxicity (1991 RTECS):

This chemical has no known mammalian reproductive toxicity.

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

PROTECTION SUGGESTED
FROM THE CHRIS MANUAL:

FIRST AID SOURCE: DOT Emergency Response Guide 1990.
Move victim to fresh air; call emergency medical care. Wipe material from skin immediately; flush skin or eyes with running water for at least 15 minutes. 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: Sodium
DOT ID NUMBER: UN1428

ERG90

GUIDE 40

* POTENTIAL HAZARDS *

*FIRE OR EXPLOSION

May ignite itself if exposed to air.
May re-ignite after fire is extinguished.
May ignite in presence of moisture.
Violent reaction with water produces flammable gas.
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.

* 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 CHEMTREC AT 1-800-424-9300 FOR EMERGENCY ASSISTANCE. If water pollution occurs, notify the appropriate authorities.

*FIRE

Do not use water or foam.
Small Fires: Dry chemical, soda ash, lime or sand.
Large Fires: Withdraw from area and let fire burn.
Magnesium Fires: Use **dry** sand, Met-L-X R powder or G-1 graphite powder.
Lithium Fires: Use dry sand, Lith-X R powder or G-1 graphite powder.
Move container from fire area if you can do it without risk.

*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.

No water on spilled material; do not get water inside container.

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

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

Large Spills: Dike liquid spill for later disposal.

Cover powder spill with plastic sheet or tarp to minimize spreading.

***FIRST AID**

Move victim to fresh air; call emergency medical care.

Wipe material from skin immediately; flush skin or eyes with running water for at least 15 minutes.

Remove and isolate contaminated clothing and shoes at the site.

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CHEMTOX DATA

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----- IDENTIFIERS -----

CHEMTOX RECORD 84
 NAME: CADMIUM
 SYNONYMS: NONE
 CAS: 7440-43-9
 FORMULA: Cd
 WLN: .CD
 CHEMICAL CLASS: Metal

LAST UPDATE OF THIS RECORD: 06/03/92

RTECS: EU9800000
 MOL WT: 112.40

See other identifiers listed below under Regulations.

----- PROPERTIES -----

PHYSICAL DESCRIPTION:

BOILING POINT:	1040 K	766.8 C	1412.3 F
MELTING POINT:	593.9 K	320.7 C	609.3 F
FLASH POINT:	NA		
AUTO IGNITION:	NA		
VAPOR PRESSURE:			
UEL:	NA		
LEL:	NA		
VAPOR DENSITY:	No data		
SPECIFIC GRAVITY:	No data		
DENSITY:	8.64		
SOLUBILITY:			
INCOMPATIBILITIES:	strong oxidizerselemental sulfur selenium tellurium		

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
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ODOR DETECTED AT (ppm):	Unknown
ODOR DESCRIPTION:	No data
100 % ODOR DETECTION:	No data

----- REGULATIONS -----

DOT hazard class:	9 CLASS 9
DOT guide:	31
Identification number:	UN3077
DOT shipping name:	ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SOLID, N.O.S.
Packing group:	III
Label(s) required:	CLASS 9
Special provisions:	8, B54
Packaging exceptions:	155

Non bulk packaging: 213
Bulk packaging: 240
Quantity limitations-
Sender air/rail: NONE
Cargo aircraft only: NONE
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) : 0.005 mg/mL»(07/30/92)

Maximum Contaminant Level Goals (MCLG): 0.005 mg/mL»(07/30/92)

CLEAN AIR ACT: CAA '90 By category

EPA WASTE NUMBER: D006

CERCLA REF: Y

RQ DESIGNATION: A 10 pounds (4.54 kg) CERCLA for pieces of
solid metal with diameter less than 100
micrometers (0.004 inches).

SARA TPQ VALUE: Not listed

SARA Sect. 312
categories:

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.
Fire hazard: flammable.

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

UNITED STATES POSTAL SERVICE MAILABILITY:
Not given

NFPA CODES:

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

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

SHORT TERM TOXICITY: IRRITANT TO NOSE AND THROAT, COUGH, CHEST PAIN,
SWEATING, CHILLS, DYSPNEA, WEAKNESS, NAUSEA, VOMITING,
DIARRHEA, ABDOMINAL CRAMPS AND POSSIBLE DEATH. **
Source: 1

LONG TERM TOXICITY: loss of smell, nose ulceration, dyspnea, emphysema,

kidney damage and mild anemia. ** source: 1

TARGET ORGANS:

resp sys, lungs, kidneys, prostate, blood

SYMPTOMS:

PULM EDEMA, CYPS, COUGH, TIGHT CHEST, **SUBS** PAIN; HEAD, CHILLS, MUSCLE ACHE; NAU, DIAR ANOSMIA, EMPHY; PROTEINURIA, ANEMIA Source: NIOSHP

CONC IDLH:

50mg/M3as dust, 9mg/M3as fume

NIOSH REL:

Potential occupational carcinogen --LOWEST FEASIBLE (LOQ 0.01 mg/M3)

**ACGIH TLV:
ACGIH STEL:**

TLV = DUST 0.05 mg/M3 as CADMIUM
as CADMIUM

OSHA PEL:

Transitional Limits:
PEL = (FUME) 0.1 MG/M3, (DUST) 0.2 MG/M3; CEILING = (FUME) 0.3 MG/M3
Final Rule Limits:
TWA = (FUME) 0.1 MG/M3; (DUST) 0.2 mg/M3
CEILING = (FUME) 0.3 MG/M3; (DUST) 0.6 mg/M3

MAK INFORMATION:

Carcinogenic working material without **MAK**
In the Commission's view, an animal carcinogen.

**CARCINOGEN?:
REFERENCES:**

Y STATUS: See below
ANIMAL POSITIVE IARC** **2, 74, 73**
ANIMAL POSITIVE **IARC** 11, 39, 76**

CARCINOGEN LISTS:

IARC: Carcinogen defined by IARC to be probably carcinogenic to humans with (usually) at least limited human evidence.
MAK: **An** animal carcinogen.
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: Not listed
OSHA: Not listed

HUMAN TOXICITY DATA: (Source: NIOSH RTECS)

ihl-man TCLo: **88 ug/m3/8.6Y** AEHLAU 28, 147, 74
KIDNEY, URETER, BLADDER
Proteinuria

ihl-hmn LCLo: **39 mg/m3/20M** AIHAAP 31, 180, 70
CARDIAC
Other changes

VASCULAR
Thrombosis distant from injection
site (except brain, heart)
LUNGS, THORAX, OR RESPIRATION
Respiratory depression

LD50 value: orl-rat LD50:225 mg/ kg

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1991)

orl-rat LD50:225 mg/kg
ihl-rat LC50:25 mg/m³/30M
ipr-rat LD50:4 mg/kg
scu-rat LD50:9 mg/kg
ivn-rat LD50:1800 ug/kg
unr-rat LD50:1140 mg/kg
orl-mus LD50:890 mg/kg
ihl-mus LCLo:170 mg/m³
ipr-mus LD50:5700 ug/kg
unr-mus LD50:890 mg/kg
orl-rbt LDLo:70 mg/kg
scu-rbt LDLo:6 mg/kg
ivn-rbt LDLo:5 mg/kg

IRRITATION DATA: (Source: NIOSH RTECS 1991)

productive toxicity (1991 RTECS):

This chemical is a mammalian reproductive toxin.

REPRODUCTIVE TOXICITY DATA (1991 RTECS)

orl-rat TDLo:155 mg/kg (13W male/13W pre-3W preg)
BECTA6 20,96,78

EFFECTS ON NEWBORN

Growth statistics(e.g.,reduced weight gain)

EFFECTS ON NEWBORN

Behavioral

orl-rat TDLo:220 mg/kg (1-22D preg) TOLED5 11,233,82

EFFECTS ON EMBRYO OR FETUS

Other effects on embryo or fetus

orl-rat TDLo:21500 ug/kg (multigenerations) ENVRAL
22,466,80

EFFECTS ON FERTILITY

Pre-implantation mortality

EFFECTS ON NEWBORN

Germ cell effects (in offspring)

orl-rat TDLo:23 mg/kg (1-22D preg) PSEBAA 158,614,78

SPECIFIC DEVELOPMENTAL ABNORMALITIES

Blood and lymphatic systems(including spleen and
marrow)

ipr-rat TDLo:1124 ug/kg (1D male) TXAPA9 41,194,77

PATERNAL EFFECTS
Spermatogenesis

scu-rat TDLo:250 ug/kg (19D preg) APTOD9 19,A122,80
EFFECTS ON NEWBORN

ivn-rat TDLo:1250 ug/kg (14D preg) JJATDK 1,264,81
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Body wall
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Urogenital system

ivn-rat TDLo:1250 ug/kg (9D preg) JJATDK 1,264,81
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Central nervous system
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Eye, ear

ivn-rat TDLo:8 mg/kg (8-15D preg) JJATDK 1,264,81
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)

orl-mus TDLo:448 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:1700 mg/kg (8-12D preg) TCMUD8 6,361,86
EFFECTS ON NEWBORN
Viability index(# alive at day 4 per # born alive)
EFFECTS ON NEWBORN
Growth statistics(e.g.,reduced weight gain)

ipr-mus TDLo:1686 ug/kg (7D preg) TJADAB 28,39A,83
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Central nervous system

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

PROTECTION SUGGESTED
FROM THE CHRIS MANUAL:

NIOSH POCKET GUIDE TO CHEMICAL HAZARDS:

** WEAR EYE PROTECTION TO PREVENT:

** EXPOSED PERSONNEL SHOULD WASH:

At the end of each work shift when there was a reasonable probability of c

WORK CLOTHING SHOULD BE CHANGED DAILY:

If there is any possibility that the clothing may be contaminated.

+* THE FOLLOWING EQUIPMENT SHOULD BE MADE AVAILABLE:

Eyewash.

REFERENCE: NIOSH

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

Greater at any detectable concentration. : **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: irr immed

SKIN: soap wash

INHALATION: art resp

INGESTION: water, vomit

FIRST AID SOURCE: DOT Emergency Response Guide 1990.

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: ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SOLID, N.O.S.

DOT ID NUMBER: UN3077

ERG90

GUIDE 31

* POTENTIAL HAZARDS *

*FIRE OR EXPLOSION

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

*HEALTH HAZARDS

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. Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection. CALL CHEMTREC AT 1-800-424-9300 FOR EMERGENCY ASSISTANCE. 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.

Do not scatter spilled material with high-pressure water streams.

Dike fire-control water for later disposal.

***SPILL OR LEAK**

Stop leak if you can do it without risk.

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

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.

Cover powder spill with plastic sheet or tarp to minimize spreading.

***FIRST AID**

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, omissions within this database, or in any of its printed or displayed output forms.

CHEMTOX DATA

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----- IDENTIFIERS -----

CHEMTOX RECORD 116
 NAME: CHROMIUM
 SYNONYMS:
 CAS: 7440-47-3 RTECS: GB4200000
 FORMULA: Cr MOL WT: 51.996
 WLN: CR
 CHEMICAL CLASS: Metal

LAST UPDATE OF THIS RECORD: 06/03/92

See other identifiers listed below under Regulations.

----- PROPERTIES -----

PHYSICAL DESCRIPTION: steel-gray metal or silver metal powder. (nydh)
 BOILING POINT: 2915 K 2641.8 C 4787.3 F
 MELTING POINT: 2173 K 1899.8 C 3451.7 F
 FLASH POINT: NA
 AUTO IGNITION: NA
 VAPOR PRESSURE:
 UEL: NA
 LEL: NA
 VAPOR DENSITY: No data
 SPECIFIC GRAVITY: No data
 DENSITY: 7.200
 WATER SOLUBILITY:
 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): unknown
 ODOR DESCRIPTION: NONE Source: NYDH
 100 % ODOR DETECTION: No data

----- REGULATIONS -----

DOT hazard class: 9 CLASS 9
 DOT guide: 31
 Identification number: UN3077
 DOT shipping name: ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SOLID, N.O.S.
 Packing group: III
 Label(s) required: CLASS 9
 Special provisions: 8, B54
 Packaging exceptions: 155
 For bulk packaging: 213

Bulk packaging: 240
Quantity limitations-
Passenger air/rail: NONE
Cargo aircraft only: NONE
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): 0.1 mg/mL (07/30/92)

Maximum Contaminant Level Goals (MCLG): 0.1 mg/mL (07/30/92)

CLEAN AIR ACT: CAA '90 By category

EPA WASTE NUMBER: D007

CERCLA REF: Y

RQ DESIGNATION: D 5000 pounds (2270 kg) CERCLA for pieces of solid metal with diameter less than 100 micrometers (0.004 inches).

SARA TPQ VALUE: Not listed

SARA Sect. 312

categories:

Chronic toxicity: carcinogen

LISTED IN SARA Sect 313: Yes

de minimus CONCENTRATION: 0.1 percent

UNITED STATES POSTAL SERVICE MAILABILITY:

Not given

NFPA CODES:

HEALTH HAZARD (BLUE): Unspecified

FLAMMABILITY (RED): Unspecified

REACTIVITY (YELLOW): Unspecified

SPECIAL : Unspecified

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

SHORT TERM TOXICITY: INHALATION: dust may cause irritation of the nose, throat and lungs. SKIN: dust may cause irritation. Eyes: dust may cause irritation. INGESTION: dust may cause irritation of the mouth and throat. (NYDH)

LONG TERM TOXICITY: no information found on exposure to chromium metal. see specific chromium compounds. (NYDH)

TARGET ORGANS:

SYMPTOMS : HISTOLOGIC FIBROSIS OF LUNGS Source: NIOSHP

CONC IDLH: unknown

NIOSH REL:

ACGIH TLV: TLV = 0.5 mg/M3
ACGIH STEL: Not listed

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

MAK INFORMATION: Not listed

CARCINOGEN? : Y STATUS: See below

REFERENCES:
ANIMAL SUSPECTED IARC** 2,100,73
ANIMAL INDEFINITE IARC** 23,205,80

CARCINOGEN LISTS :

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

MAK: Not listed

NIOSH: Not listed

NTP: Carcinogen defined by NTP as
known to be carcinogenic, with
evidence from human studies.

ACGIH: Not listed

OSHA: Not listed

LD50 value: No LD50 in RTECS 1992

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1991)

unr-rat LD50:27500 ug/kg

IRRITATION DATA: (Source: NIOSH RTECS 1991)

Reproductive toxicity (1991 RTECS):

This chemical has no known mammalian reproductive toxicity.

REPRODUCTIVE TOXICITY DATA (1991 RTECS)

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

PROTECTION SUGGESTED
FROM THE CHRIS MANUAL:

OSHA 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 contaminated.

**** REFERENCE: NIOSH**

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

2.5 mg/M3: Any dust and mist respirator except single-use respirators. * Substance reported to cause eye irritation or damage may require eye protection.

5 mg/M3: Any dust and mist respirator except single-use and quarter-mask respirators. * 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.

12.5 mg/M3: Any powered air-purifying respirator with a dust and mist filter. * Substance reported to cause eye irritation or damage may require eye protection. / 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 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. * Substance reported to cause eye irritation or damage may require eye protection. / Any self-contained breathing apparatus with a full facepiece. / Any supplied-air respirator with a full facepiece.

250 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: 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: irr immed

SKIN: soap wash

INHALATION: art resp

INGESTION: water, vomit

FIRST AID SOURCE: DOT Emergency Response Guide 1990.

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: ENVIRONMENTALLY HAZARDOUS SUBSTANCES, SOLID, N.O.S.

DOT ID NUMBER: UN3077

ERG90

GUIDE 31

* POTENTIAL HAZARDS *

*FIRE OR EXPLOSION

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

*HEALTH HAZARDS

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.

Positive pressure self-contained breathing apparatus (SCBA) and structural firefighters' protective clothing will provide limited protection.

CALL CHEMTREC AT 1-800-424-9300 FOR EMERGENCY ASSISTANCE. 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.

Do not scatter spilled material with high-pressure water streams.

Dike fire-control water for later disposal.

*SPILL OR LEAK

Stop leak if you can do it without risk.

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

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.

Cover powder spill with plastic sheet or tarp to minimize spreading.

*FIRST AID

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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----- IDENTIFIERS -----

CHEMTOX RECORD 247 LAST UPDATE OF THIS RECORD: 06/03/92
 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

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:	NA		
AUTO IGNITION:	NA		
VAPOR PRESSURE:	1mm @ 973 C		
UEL:	NA		
LEL:	NA		
APC SPECIFIC GRAVITY:	No data		
DENSITY:	11.34		
DENSITY:	11.34 g/mL @ 20 C		
WATER SOLUBILITY:	INSOLUBLE; DISSOLVES SLOWLY IN WATER CONTAINING A WEAK ACID		
INCOMPATIBILITIES:	strong oxidizers hydrogen peroxide active metals sodium potassium chlorine trifluoride hydrogen peroxide zirconium disdium 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
 .5 ug/M3 maximum arithmetic mean averaged over a calendar year

National Secondary Ambient Air Quality Standards
same as primary standard

hazard class: 6.1 POISON
DOT guide: 53
Identification number: UN2291
DOT shipping name: LEAD COMPOUNDS, SOLUBLE, N.O.S.
Packing group: II
Label(s) required: POISON
Special provisions:
Packaging exceptions: 153
Non bulk packaging: 213
Bulk packaging: 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): 0.05 mg/mL (12/07/92)

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

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

SPA WASTE NUMBER: D008

CERCLA REF: Y

DESIGNATION: X 1 pound (0.454 kg) CERCLA for pieces of
solid metal with diameter less than 100
micrometers (0.004 inches).

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: 0.1 percent

UNITED STATES POSTAL SERVICE MAILABILITY:

Hazard class: ORM-B

Mailability: Domestic service and air transportation; shipper's declaratic

Max per parcel: 25 LBS; 5 LBS

NFPA CODES:

HEALTH HAZARD (BLUE): Unspecified

FLAMMABILITY (RED) : Unspecified

REACTIVITY (YELLOW): Unspecified

SPECIAL : Unspecified

----- 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 DISTURBANCE, 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 = 0.15 mg/M3

ACGIH STEL: Not listed

OSHA PEL: Final Rule Limits:
TWA = See 29 CFR 1910.1025
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: Not listed
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 1991)

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

IRRITATION DATA: (Source: NIOSH RTECS 1991)

Reproductive toxicity (1991 RTECS):

This chemical is a mammalian reproductive toxin.

REPRODUCTIVE TOXICITY DATA (1991 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 (1-21Dpreg) 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

NO SIGNIFICANT
RISK LEVEL(Ca P65) : E0.5 micrograms/day

----- 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

LEAD

- 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: irrigate

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 the site.

..... INITIAL INCIDENT RESPONSE

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

ERG90

GUIDE 53

* POTENTIAL HAZARDS *

*HEALTH HAZARDS

- Poisonous if swallowed.
- Inhalation of dust 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 CHEMTREC AT 1-800-424-9300 FOR EMERGENCY ASSISTANCE. 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; 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.

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forms.

----- IDENTIFIERS -----

CHEMTOX RECORD **49** LAST UPDATE OF THIS RECORD: **06/03/92**
 NAME: ARSENIC
 SYNONYMS: ARSENICALS; ARSEN (German, Polish); ARSENIC BLACK;
 ARSENIC-75; ARSENIC, SOLID; COLLOIDAL ARSENIC; GREY
 ARSENIC; METALLIC ARSENIC
 CAS: **7440-38-2** RTECS: **CG0525000**
 FORMULA: **As4** MOL WT: **299.69**
 WLN: **As4**
 CHEMICAL CLASS: Metal

See other identifiers listed below under Regulations.

----- PROPERTIES -----

PHYSICAL DESCRIPTION: silvery to black, brittle; grey, shiny, metallic
 looking; crystalline and amorphous metalloid

BOILING POINT: **888 K** **614.8 C** **1138.7 F**
 MELTING POINT: **1087 K** **813.8 C** **1496.9 F**
 FLASH POINT: NA
 AUTO IGNITION: NA
 VAPOR PRESSURE: 1mm @ 372 C
 MEL: NA
 SOL: NA
 VAPOR DENSITY: No data
 SPECIFIC GRAVITY: 2.026
 DENSITY: **5.724 g/mL**
 WATER SOLUBILITY: INSOL
 INCOMPATIBILITIES: oxidizers acids; bromine oxide
 dirubidium acetylide halogens
 palladium zinc platinum nitrogen
 trichloride silver nitrate chromium
 trioxide sodium peroxide

REACTIVITY WITH WATER: No data on water reactivity
 REACTIVITY WITH COMMON MATERIALS: CAN REACT VIGOROUSLY ON CONTACT WITH
 OXIDIZING MATERIALS. MODERATE FIRE
 HAZARD, IN THE FORM OF DUST WHEN
 EXPOSED TO HEAT OR FLAME OR BY CHEMICAL
 REACTION WITH POWERFUL OXIDIZERS SUCH
 AS BROMATES, CHLORATES, IODATES,
 PEROXIDES, LITHIUM, NITROGEN
 TRICHLORIDE

STABILITY DURING TRANSPORT: No Data
 NEUTRALIZING AGENTS: No data
 POLYMERIZATION POSSIBILITIES: No data

TOXIC FIRE GASES: WHEN HEATED OR ON CONTACT WITH ACID OR
 ACID FUMES, EMITS HIGHLY TOXIC FUMES
 UNKNOWN DETECTED AT (ppm): unknown

ODOR DESCRIPTION:
100 % ODOR DETECTION:

GARLIC Source:Unspecified
No data

----- REGULATIONS -----

DOT hazard class: 6.1 POISON
DOT guide: 53
Identification number: UN1558
DOT shipping name: Arsenic
Packing group: II
Label(s) required: POISON
Special provisions:
Packaging exceptions: None
Non bulk packaging: 212
Bulk packaging: 242
Quantity limitations-
Passenger air/rail: 25 kg
Cargo aircraft only: 100 kg
Vessel stowage: A
Other stowage provisions:M2

STCC NUMBER: 4923207

CLEAN WATER ACT Sect.307:Yes

CLEAN WATER ACT Sect.311:No

National Primary Drinking Water Regulations

Maximum Contaminant Levels (MCL) : 0.05 mg/mL (12/24/75)

Maximum Contaminant Level Goals (MCLG): Not specified

CAN AIR ACT: CAA '90 By category

WASTE NUMBER: D004

CERCLA REF: Y

RQ DESIGNATION: X 1 pound (0.454 kg) CERCLA for pieces of
solid metal with diameter less than 100
micrometers (0.004 inches).

SARA TPQ VALUE: Not listed

SARA Sect. 312

categories:

Chronic toxicity: carcinogen

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: Poison, Class B - Mailable as ORM-D

Mailability: Domestic service and air transportation shipper's declaration

Max per parcel: 8 OZ

NFPA CODES:

HEALTH HAZARD (BLUE): Unspecified

FLAMMABILITY (RED) : Unspecified

REACTIVITY (YELLOW): Unspecified

SPECIAL : Unspecified

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

SHORT TERM TOXICITY: COUGHING, DYSPNEA, CHEST PAINS, IRRITATION TO SKIN AND MUCOUS MEMBRANES, FEVER, INSOMNIA, ANOREXIA, LIVER SWELLING, MELANOSIS, DISTURBED HEART FUNCTION AND FACIAL EDEMA. ** Source: 15

LONG TERM TOXICITY: unknown

TARGET ORGANS:

SYMPTOMS: NAUSEA, VOMITING, DIARRHEA, DEATH Source:

CONC IDLH: 100mg/M3

NIOSH REL: Potential occupational carcinogen 0.002 mg/M3
Ceiling exposures which shall at no time be exceeded

ACGIH TLV: TLV = 0.2 mg/M3

ACGIH STEL: Not listed

OSHA PEL: Final Rule Limits:
TWA = 0.01 mg/M3
CONSULT 29CFR 1910.1018

MAK INFORMATION: Not listed

CARCINOGEN? : Y STATUS: See below

REFERENCES :

HUMAN POSITIVE IARC** 23,39,80
INDEFINITE IARC** 2,48,73

CARCINOGEN LISTS:

IARC: Carcinogen as defined by
IARC as carcinogenic to humans,
with sufficient epidemiological
evidence.

MAK: Not listed

NIOSH: Carcinogen defined by NIOSH
with no further categorization.

NTP: Carcinogen defined by NTP as
known to be carcinogenic, with
evidence from human studies.

ACGIH: Not listed

OSHA: Cancer hazard

HUMAN TOXICITY DATA: (Source: NIOSH RTECS)

orl-man TDLo:7857 mg/kg/55Y CMAJAX 120,168,79

GASTROINTESTINAL

Changes on structure or function of esophagus

BLOOD

Hemorrhage

SKIN AND APPENDAGES

Skin - after systemic exposure

Dermatitis, other

LD50 value: orl-rat LD50:763 mg/ kg

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1991)

orl-rat LD50:763 mg/kg
ipr-rat LD50:13390 ug/kg
orl-mus LD50:145 mg/kg
ipr-mus LD50:46200 ug/kg
scu-rbt LDLo:300 mg/kg
ipr-gpg LDLo:10 mg/kg
scu-gpg LDLo:300 mg/kg

IRRITATION DATA: (Source: NIOSH RTECS 1991)

Reproductive toxicity (1991 RTECS):

This chemical is a mammalian reproductive toxin.

REPRODUCTIVE TOXICITY DATA (1991 RTECS)

orl-rat TDLo:605 ug/kg (35W pre) GISAAA 42(8),30,77
EFFECTS ON FERTILITY
Pre-implantation mortality
EFFECTS ON FERTILITY
Post-implantation mortality

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

**PROTECTION SUGGESTED
FROM THE CHRIS MANUAL:**

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

Unknown concentration or Greater than 20000 ug/M3 (20 mg/M3) or
Firefighting: Any full facepiece self-contained breathing apparatus
operated in positive pressure mode.

Not greater than 20000 ug/M3 (20 mg/M3): Supplied air respirator with
full facepiece hood, or helmet or suit and operated in positive pressure
mode.

Not greater than 10000 ug/M3 (10 mg/M3): (A) Powered air-purifying
respirators in all inlet face coverings with high efficiency filters.1
(B) Half-mask supplied air respirators operated in positive pressure
mode.

Not greater than 500 ug/M3: (A) Full facepiece air-purifying respirator
equipped with high-efficiency filter.1 (B) **Any** full facepiece supplied
air respirator. (C) **Any** full facepiece self-contained breathing
apparatus.

Not greater than 100 ug/M3: (A) Half-mask air-purifying respirator
equipped with high-efficiency filter.1 (B) Any half-mask supplied air
respirator.

FIRST AID SOURCE: THIC

E: irrigate eyes with water.

SKIN: wash contaminated areas of body with soap and water.

INHALATION: None given

INGESTION: None given

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.

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

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

DOT SHIPPING NAME: Arsenic

DOT ID NUMBER: UN1558

ERG90

GUIDE 53

* POTENTIAL HAZARDS *

*HEALTH HAZARDS

Poisonous if swallowed.

Inhalation of dust 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 CHEMTREC AT 1-800-424-9300 FOR EMERGENCY ASSISTANCE. 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; 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.

Mailability: Domestic surface mail only
Max per parcel: 1 GAL

HAZARD 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

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

SHORT TERM TOXICITY: INHALATION: levels of 10 to 30 ppm may cause dizziness, nausea, and vomiting. levels up to 50 ppm may cause weakness, trembling, headaches, abdominal cramps, liver and kidney damage, and fluid build up in lungs. may cause coma and death at high levels. SKIN: prolonged contact may cause irritation and skin rashes. Eyes: may cause redness, pain, and blurred vision. vapor can damage the cornea. INGESTION: ingestion of 2 ounces has resulted in nausea, vomiting, faintness, drowsiness, difficulty breathing, pale skin, internal bleeding, kidney damage, and death due to respiratory failure. other possible symptoms may include abdominal spasms, severe headache, lethargy, lowered blood pressure, diarrhea, shock, physical collapse, and coma.(NYDH)

LONG TERM TOXICITY: may cause eye, nose and throat irritation, nausea, vomiting, **loss** of appetite, nerve damage, liver and kidney damage. this substance has been determined to cause cancer in laboratory animals. whether it does so in humans is not known.(NYDH)

TARGET ORGANS: kidneys, liver, eyes, skin, CNS

SYMPTOMS: Inhalation of vapors causes nausea, drunkenness, depression. Contact of liquid with eyes may produce corneal injury. Prolonged contact with skin may cause a burn. Source: CHRIS

CONC IDLH: 1000PPM

NIOSH REL: Potential occupational carcinogen 1 ppm Time weighted averages for 8-hour exposure 4 mg/M3 Time weighted averages for 8-hour exposure 2 ppm Ceiling exposures which shall at no time be exceeded 8 mg/M3 Ceiling exposures which shall at no time be exceeded

ACGIH TLV: TLV = 10 ppm(40 mg/M3)
ACGIH STEL: STEL = 15 ppm(60 mg/M3)

HAZARD PEL: Transitional Limits:

PEL = 50 PPM; CEILING = 100 PPM; MAXIMUM PEAK ABOVE CEILING
Final Rule Limits:
TWA = 1 ppm (4 mg/M3)
STEL = 2 ppm (8 mg/M3)

MAK INFORMATION: Carcinogenic working material without MAK
In the Commission's view, an animal carcinogen.

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: **An** animal carcinogen.

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: Not listed

OSHA: Not listed

HUMAN TOXICITY DATA: (Source: NIOSH RTECS)

ihl-man TCLo:4000 ppm/1H PCOC** -,500,66
PERIPHERAL NERVE **AND** SENSATION
Flaccid paralysis without anesthesia
BEHAVIORAL
coma
GASTROINTESTINAL
Nausea or vomiting

orl-hmn LDLo:286 mg/kg CLCEAL 86,203,47
GASTROINTESTINAL
Ulceration or bleeding from stomach
GASTROINTESTINAL
Nausea or vomiting
LIVER
Fatty liver degeneration

orl-hmn TDLo:428 mg/kg SOMEAU 22(10),132,58
BEHAVIORAL
Somnolence (general depressed activity)
LUNGS, THORAX, OR RESPIRATION
Cough
GASTROINTESTINAL
Nausea or vomiting

orl-man TDLo:892 mg/kg WILEAR 28,983,75
GASTROINTESTINAL
Hypermotility, diarrhea

GASTROINTESTINAL
Nausea or vomiting
LIVER
Jaundice, other or unclassified

LD50 value: orl-rat LD50:670 mg/ kg

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1991)

orl-rat LD50:670 mg/kg
ihl-rat LC50:1000 ppm/7H
ipr-rat LD50:807 mg/kg
scu-rat LD50:1 gm/kg
orl-mus LD50:489 mg/kg
ihl-mus LCLo:5 gm/m3/2H
ipr-mus LD50:470 mg/kg
scu-mus LDLo:380 mg/kg
orl-dog LD50:5700 mg/kg
ivn-dog LDLo:175 mg/kg
ihl-mky LC50:3000 ppm/7H
orl-rbt LD50:860 mg/kg
ihl-rbt LCLo:3000 ppm/7H
skn-rbt LD50:2800 mg/kg
scu-rbt LDLo:1200 mg/kg
ihl-pig LCLo:3000 ppm/7H
ihl-gpg LCLo:1500 ppm/7H
ipr-gpg LDLo:600 mg/kg

CITATION DATA: (Source: NIOSH RTECS 1991)

skn-rbt 625 mg open MLD
eye-rbt 63 mg SEV

Reproductive toxicity (1991 RTECS):

This chemical is a mammalian reproductive toxin.

REPRODUCTIVE TOXICITY DATA (1991 RTECS)

ihl-rat TCLo:300 ppm/7H (6-15D preg) BANRDU 5,149,80
EFFECTS ON FERTILITY
Post-implantation mortality

NO SIGNIFICANT

RISK LEVEL(Ca P65) : 10 micrograms/day

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

PROTECTION SUGGESTED

FROM THE CHRIS MANUAL:

clean, body-covering clothes & safety glasses with side shields.
respiratory protection: up to 50 ppm, none; 50 ppm to 2%, full face mask
& canister; greater than 2%, self-contained breathing apparatus.

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 (ETHYLENE DICHLORIDE)

Greater at any detectable concentration. : 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, remove him to fresh air, keep him quiet and warm, and get medical attention immediately; if breathing stops, give artificial respiration.

INGESTION: induce vomiting; call a physician; treat the symptoms.

EYES: flush immediately with copious amounts of flowing water for at least 15 min.

SKIN: remove clothing and wash skin thoroughly with soap and water; wash contaminated clothing before reuse.

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, carbon dioxide, dry chemical. Note: Water may be ineffective. CHRIS91

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

DOT SHIPPING NAME: Ethylene dichloride

DOT ID NUMBER: UN1184

ERG90

* POTENTIAL HAZARDS •

GUIDE 26

FLAME 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.

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 CHEMTREC AT 1-800-424-9300 FOR EMERGENCY ASSISTANCE. If water pollution occurs, notify the appropriate authorities.

***FIRE**

Small Fires: Dry chemical, CO₂ or Halon, water spray or alcohol-resistant foam.

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 vapors; 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 106 LAST UPDATE OF THIS RECORD: 06/03/92

NAME: CHLOROFORM

SYNONYMS: CHLOROFORM (DOT); CHLOROFORME (French); CLOROFORMIO (Italian); FORMYL TRICHLORIDE; FREON 20; METHANE TRICHLORIDE; METHANE, TRICHLORO-; METHENYL TRICHLORIDE; METHYL TRICHLORIDE; NCI-C02686; R 20; R 20 (REFRIGERANT); TCM; TRICHLORMETHAAN (Dutch); TRICHLORMETHAN (Czech); TRICHLOROFORM; TRICHLOROMETHANE; TRICHLOROMETANO (Italian)

CAS: 67-66-3 RTECS: FS9100000

FORMULA: CHCl₃ MOL WT: 119.38

WLN: .GYGG

CHEMICAL CLASS: FT

See other identifiers listed below under Regulations.

PROPERTIES

PHYSICAL DESCRIPTION: a clear, colorless mobile liquid with a characteristic odor

BOILING POINT:	333.65 K	60.5 C	140.9 F
MELTING POINT:	210.15 K	-63 C	-81.4 F
FLASH POINT:	NA	NA	NA
MINIMUM AUTO IGNITION:	NA		
BOILING POINT:	536.4 K	263.25 C	505.85 F
CRITICAL PRESS:	5.5 kN/M ²	54.2 atm	796 psia
HEAT OF VAP:	106.7 Btu/lb	59.25 cal/g	2.479x E5 J/kg
VAPOR PRESSURE:	160 MM		
UEL:	NA		
LEL:	NA		
IONIZATION POTENTIAL (eV):	11.42		
VAPOR DENSITY:	4.1 (air-1)		
EVAPORATION RATE:	10.20 (n-BUTYL ACETATE=1)		
SPECIFIC GRAVITY:	1.49 20C		
DENSITY:	1.492		
WATER SOLUBILITY:	0.8%		
INCOMPATIBILITIES:	strong caustics chemically active metals such as aluminum magnesium powder sodium potassium		

REACTIVITY WITH WATER: No data on water reactivity

REACTIVITY WITH COMMON MATERIALS: DECOMPOSES SLOWLY IN SUNLIGHT, REACTION MAY BE ACCELERATED BY IRON AND WATER AT HIGH TEMPERATURES Source: THIC

STABILITY DURING TRANSPORT: No Data

NEUTRALIZING AGENTS: No data

POLYMERIZATION POSSIBILITIES: No data

TOXIC FIRE GASES: HCl, PHOSGENE

CONCENTRATION DETECTED AT (ppm): 205-307 ppm

ODOR DESCRIPTION:
100 % ODOR DETECTION:

Pleasant, sweet; ethereal Source:CHRIS
No data

----- REGULATIONS -----

DOT hazard class: 6.1 POISON
DOT guide: 55
Identification number: UN1888
DOT shipping name: Chloroform
Packing group: II
Label(s) required: POISON
Special provisions: N36,T14
Packaging exceptions: None
Non bulk packaging: 202
Bulk packaging: 243
Quantity limitations-
Passenger air/rail: 5 L
Cargo aircraft only: 60 L
Vessel stowage: A
Other stowage provisions:40,M2

STCC NUMBER: 4940310, 4940311

CLEAN WATER ACT Sect.307:Yes

CLEAN WATER ACT Sect.311:Yes

National Primary Drinking Water Regulations

Maximum Contaminant Levels (MCL): 0.10 mg/mL (11/29/81)

Maximum Contaminant Level Goals (MCLG): Not specified

FEDERAL AIR ACT: CAA '90 Listed

WASTE NUMBER: U044,D022

CERCLA REF: Y

RQ DESIGNATION: A 10 pounds (4.54 kg) CERCLA

SARA TPQ VALUE: 10000 pounds

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 minimis CONCENTRATION: 0.1 percent

UNITED STATES POSTAL SERVICE MAILABILITY:

Hazard class: ORM-A

Mailability: Domestic service and air transportation; shipper's declaratio:

Max per parcel: 1 GAL; 1 PT

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

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

SHORT TERM TOXICITY: INHALATION: symptoms are generally not observed at exposures below 90 ppm for 7 minutes. effects may include headaches, pounding heart, dizziness, slowed reactions, unconsciousness, coma and death. delayed effects of exposure which may not occur for up to 24 hours can include cramps, muscle tremors, jaundice, profuse sweating, liver damage, coma and death. SKIN: can cause reddening of the skin, followed by blistering and chemical burns on prolonged contact. Eyes: vapors may cause stinging sensation. splashes may cause pain, burning, redness and damage to tissues. INGESTION: may cause nausea, vomiting and other symptoms as listed under inhalation. for an adult, death may result from 30 ml (1 liquid ounce). (NYDH)

LONG TERM TOXICITY: the following symptoms have been observed in people exposed to levels up to 200 ppm over periods of weeks, months or years: depression, hallucination, sluggishness, loss of appetite, fatigue and liver and kidney damage. chloroform is a cancer suspect agent because high levels cause kidney and liver cancer in rats and mice. (NYDH)

TARGET ORGANS: liver, kidneys, heart, eyes, skin, CNS

SYMPTOMS: Headache, nausea, dizziness, drunkenness, narcosis.
Source: CHRIS

CONC IDLH: 1000ppm

NIOSH REL: Potential occupational carcinogen 2 ppm Ceiling exposures which shall at no time be exceeded(60-MIN)
9.78 mg/M3 Ceiling exposures which shall at no time be exceeded (60 MIN)

ACGIH TLV: TLV = 10 ppm Suspected human carcinogen (A2)
ACGIH STEL: Not listed

OSHA PEL: Transitional Limits:
PEL = (C) 50 ppm (**(C) 240mg/M3**)
Final Rule Limits:
TWA = 2 ppm (9.78 mg/M3)

***K INFORMATION: 10 ppm
50 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.

Risk of damage to the developing embryo or fetus must be considered probable. Damage cannot be excluded even when the MAK values are adhered to.

A compound which is justifiably suspected of having carcinogenic potential.

CARCINOGEN?: Y STATUS: See below

REFERENCES:

ANIMAL POSITIVE IARC** 20,401,79
HUMAN SUSPECTED IARC** 20,401,79
ANIMAL SUSPECTED IARC** 1,61,72

CARCINOGEN LISTS:

IARC: Carcinogen defined by IARC to be possibly carcinogenic to humans, but having (usually) no 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: Not listed

HUMAN TOXICITY DATA: (Source: NIOSH RTECS)

ihl-hmn TCLo:10 mg/m3/1Y IRGGAJ 24,127,67

BEHAVIORAL

Anorexia (human)

GASTROINTESTINAL

Nausea or vomiting

GASTROINTESTINAL

Other changes

* ihl-hmn LCLo:25000 ppm/5M TABIA2 3,231,33

ihl-hmn TCLo:5000 mg/m3/7M AHBAAM 116,131,36

BEHAVIORAL

Hallucinations, distorted perceptions

50 value:

orl-rat LD50:908 mg/ kg

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1991)

orl-rat LD50:908 mg/kg
ihl-rat LC50:47702 mg/m³/4H
ipr-rat LD50:894 mg/kg
orl-mus LD50:36 mg/kg
ihl-mus LCLo:28 gm/m³
ipr-mus LD50:623 mg/kg
scu-mus LD50:704 mg/kg
orl-dog LDLo:1 gm/kg
ihl-dog LCLo:100 gm/m³
ipr-dog LD50:1000 mg/kg
ivn-dog LDLo:75 mg/kg
ihl-cat LCLo:35 gm/m³/4H
orl-rbt LDLo:500 mg/kg
ihl-rbt LCLo:59 gm/m³
skn-rbt LD50:>4 gm/kg
scu-rbt LDLo:800 mg/kg
orl-gpg LD50:820 mg/kg
ihl-gpg LCLo:20000 ppm/2H
ihl-frg LCLo:6000 mg/m³
ihl-mam LCLo:25000 ppm/5M

IRRITATION DATA: (Source: NIOSH RTECS 1991)

skn-rbt 10 mg/24H open MLD
eye-rbt 148 mg

Reproductive toxicity (1991 RTECS):

This chemical is a mammalian reproductive toxin.

REPRODUCTIVE TOXICITY DATA (1991 RTECS)

orl-rat TDLo:1260 mg/kg (6-15D preg) TXAPA9 29,348,74
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

orl-rat TDLo:4 gm/kg (6-15D preg) JPFCD2 18,333,83
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)

ihl-rat TCLo:30 ppm/7H (6-15D preg) TXAPA9 28,442,74
EFFECTS ON FERTILITY
Other measures of fertility
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

ihl-rat TCLo:100 ppm/7H (6-15D preg) TXAPA9 28,442,74
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Gastrointestinal system
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Homeostatis

ihl-rat TCLo:300 ppm/7H (6-15D preg) TXAPA9 28,442,74
EFFECTS ON FERTILITY
Female fertility index
EFFECTS ON FERTILITY
Post-implantation mortality

ihl-rat TCLo:20100 ug/m3/1H (7-14D preg) NTIS**
PB277-077
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)
EFFECTS ON EMBRYO OR FETUS
Fetal death

orl-mus TDLo:2177 mg/kg (3W male/3W pre-7D post) NETOD7
1,199,79
EFFECTS ON NEWBORN
Growth statistics(e.g.,reduced weight gain)
EFFECTS ON NEWBORN

orl-mus TDLo:2115 mg/kg (3W male/3W pre-5D post) EVHPAZ
46,127,82
EFFECTS ON NEWBORN
Other postnatal measures or effects

ihl-mus TCLo:100 ppm/7H (1-7D preg) TXAPA9 50,515,79
EFFECTS ON FERTILITY
Female fertility index
EFFECTS ON FERTILITY
Post-implantation mortality
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)

ihl-mus TCLo:100 ppm/7H (8-15D preg) TXAPA9 50,515,79
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Craniofacial(including nose and tongue)

NO SIGNIFICANT
RISK LEVEL(Ca P65): 9 micrograms/day

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

PROTECTION SUGGESTED
FROM THE CHRIS MANUAL:
chemical goggles, 50 ppm to 2%; suitable full-face mask. above 2%:
suitable self-contained system.

NIOSH POCKET GUIDE TO CHEMICAL HAZARDS:

** WEAR APPROPRIATE EQUIPMENT TO PREVENT:
Reasonable probability of 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 contaminated.

** REFERENCE: NIOSH

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

Greater at any detectable concentration. : 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 ill effects develop, get victim to fresh air, keep him warm and quiet, and get medical attention. If breathing stops, start artificial respiration.

INGESTION: induce vomiting and get medical attention. No known antidote; treat symptoms.

EYES: flush with plenty of water for at least 15 minutes and get medical attention.

WASH: wash with soap and water, remove contaminated clothing and free of chemical.

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. Remove and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature. Effects may be delayed; keep victim under observation.

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

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

DOT SHIPPING NAME: Chloroform

DOT ID NUMBER: UN1888

ERG90

* POTENTIAL HAZARDS *

GUIDE 55

***HEALTH HAZARDS**

Poisonous; may be fatal if inhaled, swallowed or absorbed through skin. Contact may cause burns to skin and eyes through skin.

Runoff from fire control or dilution water may give off poisonous gases and cause water pollution.

Fire may produce irritating or poisonous gases.

***FIRE OR EXPLOSION**

Some of these materials may burn, but none of them ignites readily. Container may explode violently 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 chemical protective clothing which is specifically recommended by the shipper or manufacturer may be worn. It may provide little or no thermal protection.

Structural firefighter's protective clothing is not effective for these materials.

Remove and isolate contaminated clothing at the site.

CALL CHEMTREC AT 1-800-424-9300 AS SOON AS POSSIBLE, especially if there is no local hazardous materials team available.

***FIRE**

Small Fires: Dry chemical, 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.

Fight fire from maximum distance. Stay away from ends of tanks.

Dike fire control water for later disposal; do not scatter the material.

***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 vapors,

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; move containers from spill area.

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 or eyes with running water for at least 15 minutes.

Speed in removing material from skin is of extreme importance.

Remove and isolate contaminated clothing and shoes at the site.

Keep victim quiet and maintain normal body temperature.

Effects may be delayed; keep victim under observation.

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CHEMTOX DATA

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IDENTIFIERS

CHEMTOX RECORD 99 LAST UPDATE OF THIS RECORD: 06/03/92

NAME: CARBON TETRACHLORIDE

SYNONYMS: BENZINFORM; CARBONA; CARBON CHLORIDE; CARBON TET; CARBON TETRACHLORIDE ; CZTEROCHLOREK WEGLA (Polish); ENT 4,705; FASCIOLIN; FLUKOIDS; FREON 10; HALON 104; METHANE TETRACHLORIDE; METHANE, TETRACHLORO-; NECATORINA; NECATORINE; PERCHLOROMETHANE; R 10; TETRACHLOORKOOLSTOF (Dutch); TETRACHLOORMETAAN; TETRACHLORKOHLLENSTOFF, TETRA (German); TETRACHLORMETHAN (German); TETRACHLOROCARBON; TETRACHLOROMETHANE; TETRACHLORURE DE CARBONE (French); TETRACHLOROMETANO (Italian); TETRACHLORURO DI CARBONIO (Italian); TETRAFINOL; TETRAFORM; TETRASOL; UNIVERM; VERMOESTRICID

CAS: 56-23-5 RTECS: . FG4900000

FORMULA: CC14 MOL WT: 153.82

WLN: GXGGG

CHEMICAL CLASS: FT

See other identifiers listed below under Regulations.

PROPERTIES

PHYSICAL DESCRIPTION: colorless, watery liquid with a sweet odor.

BILLING POINT:	349.87 K	76.7 C	170 F
MELTING POINT:	250.4 K	-22.8 C	-9 F
FLASH POINT:	NA	NA	NA
AUTO IGNITION:	NA		
CRITICAL TEMP:	556 K	282.85 C	541.13 F
CRITICAL PRESS:	4.6 kN/M2	45.3 atm	666 psia
HEAT OF VAP:	84.2 Btu/lb	46.76 cal/g	1.956x E5 J/kg
VAPOR PRESSURE:	100MM @ 23 C		
UEL:	NA		
LEL:	NA		
IONIZATION POTENTIAL (eV):	13.3		
VAPOR DENSITY:	5.3 (air=1)		
EVAPORATION RATE:	7.52 (n-BUTYL ACETATE=1)		
SPECIFIC GRAVITY:	1.59 20c		
DENSITY:	1.597		
WATER SOLUBILITY:	0.08%		
INCOMPATIBILITIES:	chemically active metals such as sodium potassium magnesium		
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) : > 10 ppm
ODOR DESCRIPTION: that of chloroform. Source:CHRIS
% ODOR DETECTION: No data

----- REGULATIONS -----

DOT hazard class: 6.1 POISON
DOT guide: 55
Identification number: UN1846
DOT shipping name: Carbon tetrachloride
Packing group: II
Label(s) required: POISON
Special provisions: N36,T8
Packaging exceptions: None
Non bulk packaging: 202
Bulk packaging: 243
Quantity limitations-
Passenger air/rail: 5 L
Cargo aircraft only: 60 L
Vessel stowage: A
Other stowage provisions:40,M2

STCC NUMBER: 4940320

CLEAN WATER ACT Sect.307:Yes

CLEAN WATER ACT Sect.311:No

National Primary Drinking Water Regulations

Maximum Contaminant Levels (MCL) : 0.005 mg/mL*(01/09/89)

Maximum Contaminant Level Goals (MCLG): 0 mg/mL*(01/09/89)

CLEAN AIR ACT: CAA '90 Listed

EPA WASTE NUMBER: U211,D019

CERCLA REF: Y

RQ DESIGNATION: A 10 pounds (4.54 kg) CERCLA

SARA TPQ VALUE: Not listed

SARA Sect. 312

categories:

Acute toxicity: Highly toxic. LD50 is 50 mg/kg
or less (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

Max per parcel: 1 QT

NFPA CODES:

HEALTH HAZARD (BLUE): (3) Extremely hazardous to health. Full protection required. No skin surface should be exposed.
FLAMMABILITY (RED) : (0) This material does not readily burn.
REACTIVITY (YELLOW): (0) Stable even under fire conditions.
SPECIAL : Unspecified

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

SHORT TERM TOXICITY: INHALATION: levels of 20 ppm may cause dizziness, **headache**, vomiting, visual disturbances, extreme fatigue and nose and throat irritation. other symptoms may include restlessness, loss of balance, twitching and tremors. severe exposure can lead to liver, kidney, eye and nerve damage that may be delayed after exposure; can cause breathing stoppage, coma and death. 1,000 ppm for an unspecified time has caused death. SKIN: may cause irritation and redness; carbon tetrachloride is readily absorbed through the skin. symptoms as listed above may occur through skin absorption even when vapor concentrations are below osha standard. Eyes: may cause irritation and redness. INGESTION: may **casue** severe abdominal pain with diarrhea, followed by symptoms described under inhalation. death may occur by ingestion of as little as 1/2 teaspoon. (NYDH)

LONG TERM TOXICITY: between **45** and 100 ppm, carbon tetrachloride may cause headache, drowsiness, fatigue, nausea and vomiting. 100 to 300 ppm may cause additional effects of mental confusion, weight loss and sluggishness. liver, kidney, eye and nerve damage can result from more severe exposures. coma and death may occur. (NYDH)

TARGET ORGANS: CNS, eyes, lungs, liver, kidneys, skin

SYMPTOMS: Dizziness, incoordination, anesthesia; may be accompanied by nausea and liver damage. Kidney damage also occurs, often producing decrease or stopping of urinary output. Source: CHRIS

CONC IDLH: 300PPM

NIOSH REL: Potential occupational carcinogen 2 ppm Ceiling exposures which shall at no time be exceeded(60-MIN)
12.6 mg/M3 Ceiling exposures which shall at no time be exceeded(60-MIN)

ACGIH TLV: TLV = **5 ppm** SKIN Suspected human carcinogen (A2)
ACGIH STEL: Not listed

OSHA PEL: Transitional Limits:
PEL = 10 PPM; CEILING = **25** PPM; MAXIMUM PEAK ABOVE CEILING E
Final Rule Limits:

TWA = 2 ppm (12.6 mg/M3)

INFORMATION:

10 ppm

65 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.

Danger of cutaneous absorption

A compound which is justifiably suspected of having carcinogenic potential.

CARCINOGEN? :

Y

STATUS: See below

REFERENCES:

ANIMAL POSITIVE IARC** 20,371,79

HUMAN SUSPECTED IARC** 20,371,79

ANIMAL POSITIVE IARC** 1,53,72

HUMAN INDEFINITE IARC** 1,53,72

CARCINOGEN LISTS:

IARC: Carcinogen defined by IARC to be possibly carcinogenic to humans, but having (usually) no 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: Not listed

HUMAN TOXICITY DATA: (Source: NIOSH RTECS)

inh-hmn TCLo:20 ppm 85CYAB 2,136,59

GASTROINTESTINAL

Nausea or vomiting

ori-wmn TDLo:1800 mg/kg TXMDAX 69,86,73

SENSE ORGANS

Eye

Miosis (pupillary constriction)

BEHAVIORAL

coma

BEHAVIORAL

Antipsychotic

orl-man TDLo:1700 mg/kg SAMJAF 49,635,75
BEHAVIORAL
Tremor
LUNGS, THORAX, OR RESPIRATION
Other changes
GASTROINTESTINAL
Other changes

* ihl-hmn LCLo:1000 ppm PCOC** -,198,66

ihl-hmn TCLo:45 ppm/3D LANCAO 1,360,60
BEHAVIORAL
Somnolence (general depressed activity)
BEHAVIORAL
Anorexia (human)
GASTROINTESTINAL
Nausea or vomiting

ihl-hmn TCLo:317 ppm/30M JAMAAP 103,962,34
GASTROINTESTINAL
Nausea or vomiting

* ihl-hmn LCLo:5 pph/5M TABIA2 3,231,33

LD50 value: orl-rat LD50:2350 mg/ kg

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1991)

orl-rat LD50:2350 mg/kg
ihl-rat LC50:8000 ppm/4H
skn-rat LD50:5070 mg/kg
ipr-rat LD50:1500 mg/kg
orl-mus LD50:8263 mg/kg
ihl-mus LC50:9526 ppm/8H
ipr-mus LD50:572 mg/kg
scu-mus LD50:31 gm/kg
orl-dog LDLo:1 gm/kg
ihl-dog LCLo:14620 ppm/8H
ipr-dog LD50:1500 mg/kg
ivn-dog LDLo:125 mg/kg
ihl-cat LCLo:38110 ppm/2H
scu-cat LDLo:300 mg/kg
orl-rbt LD50:5760 mg/kg
ipr-rbt LDLo:477 mg/kg
scu-rbt LDLo:3 gm/kg
ivn-rbt LD50:5840 mg/kg
orl-gpg LD50:5760 mg/kg
ihl-gpg LCLo:20000 ppm/2H
ipr-ckn LD50:4497 mg/kg
ihl-frg LCLo:58000 mg/m3
ihl-mam LCSO:34500 mg/m3

IRRITATION DATA: (Source: NIOSH RTECS 1991)

skn-rbt 4 mg MLD
eye-rbt 2200 ug/30S MLD
eye-rbt 500 mg/24H SEV

Reproductive toxicity (1991 RTECS):

This chemical is a mammalian reproductive toxin.

REPRODUCTIVE TOXICITY DATA (1991 RTECS)

orl-rat TDLo:2 gm/kg (7-8D preg) 85DJAS -,95,71

EFFECTS ON FERTILITY

Post-implantation mortality

orl-rat TDLo:3 gm/kg (14D preg) BEXBAN 82,1262,76

EFFECTS ON EMBRYO OR FETUS

Extra embryonic features(e.g.,placenta,umbilical cord)

orl-rat TDLo:7691 mg/kg (10D male) ESKHA5 (99),156,81

PATERNAL EFFECTS

Testes,epididymis,sperm duct

ihl-rat TCLo:300 ppm/7H (6-15D preg) TXAPA9 28,452,74

EFFECTS ON EMBRYO OR FETUS

Fetotoxicity(except death,e.g.,stunted fetus)

SPECIFIC DEVELOPMENTAL ABNORMALITIES

Musculoskeletal system

SPECIFIC DEVELOPMENTAL ABNORMALITIES

Homeostatis

ihl-rat TCLo:250 ppm/8H (10-15D preg) DABBBA 32,2021,71

EFFECTS ON NEWBORN

Viability index(# alive at day 4 per # born alive)

EFFECTS ON NEWBORN

Weaning or lactation index(#alive at weaning per # alive at day 4)

ipr-rat TDLo:71500 mg/kg (15D male) EXPEAM 22,395,66

PATERNAL EFFECTS

Testes,epididymis,sperm duct

PATERNAL EFFECTS

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

ipr-rat TDLo:5 gm/kg (1D male) TXCYAC 10,39,78

PATERNAL EFFECTS

Other effects on male

NO SIGNIFICANT

RISK LEVEL(Ca P65) : 5 micrograms/day

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

PROTECTION SUGGESTED

FROM THE CHRIS MANUAL:

Organic vapor canister with fill face mask; protective clothing; rubber gloves.

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 contaminated.

**** REFERENCE:** NIOSH

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

Greater at any detectable concentration. : 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

EYES AND

SKIN: flush with plenty of water; for eyes, get medical attention. Remove contaminated clothing and wash before reuse.

INHALATION: immediately remove to fresh air, keep patient warm and quiet and get medical attention promptly. Start artificial respiration if breathing stops.

INGESTION: induce vomiting and get medical attention promptly. No specific antidote known.

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. Remove and isolate contaminated clothing and shoes at the site. Keep victim quiet and maintain normal body temperature. Effects may be delayed; keep victim under observation.

..... INITIAL INCIDENT RESPONSE

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

DOT SHIPPING NAME: Carbon tetrachloride

DOT ID NUMBER: **UN1846**

* POTENTIAL HAZARDS *

HEALTH HAZARDS

Poisonous; may be fatal if inhaled, swallowed or absorbed through skin. Contact may cause burns to skin and eyes through skin.

Runoff from fire control or dilution water may give off poisonous gases and cause water pollution.

Fire may produce irritating or poisonous gases.

*FIRE OR EXPLOSION

Some of these materials may burn, but none of them ignites readily. Container may explode violently 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 chemical protective clothing which is specifically recommended by the shipper or manufacturer may be worn. It may provide little or no thermal protection.

Structural firefighter's protective clothing is not effective for these materials.

Remove and isolate contaminated clothing at the site.

CALL CHEMTREC AT 1-800-424-9300 AS SOON AS POSSIBLE, especially if there is no local hazardous materials team available.

*FIRE

Small Fires: Dry chemical, 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.

Fight fire from maximum distance. Stay away from ends of tanks.

Dike fire control water for later disposal; do not scatter the material.

*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 vapors.

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; move containers from spill area.

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 or eyes with running water for at least 15 minutes.

Speed in removing material from skin is of extreme importance.

Remove and isolate contaminated clothing and shoes at the site.

Keep victim quiet and maintain normal body temperature.

Effects may be delayed; keep victim under observation.

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CHEMTOX DATA

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----- IDENTIFIERS -----

CHEMTOX RECORD **407** LAST UPDATE OF THIS RECORD: **06/03/92**
 NAME: TRICHLOROETHYLENE
 SYNONYMS: TRICHLOROETHENE; ETHYLENE TRICHLORIDE; TRICLENE
 CAS: **79-01-6** RTECS: **KX4550000**
 FORMULA: **C2HCl3** MOL WT: **131**
 WLN: **GYGU1G**
CHEMICAL CLASS: FT

See other identifiers listed below under Regulations.

----- PROPERTIES -----

PHYSICAL DESCRIPTION: colorless watery liquid with a sweet odor
 BOILING POINT: **359.82 K** **86.6 C** **188 F**
 MELTING POINT: **187.04 K** **-86.2 C** **-123 F**
 FLASH POINT: NONE NONE NONE
 AUTO IGNITION: **683 K** **409.8 C** **769.7 F**
 VAPOR PRESSURE: 58 MM
 UEL: **41 %**
 LEL: **11 %**
 IONIZATION POTENTIAL (eV): **9.47**
 VAPOR DENSITY: **4.5 (air=1)**
 EVAPORATION RATE: **6.39 (n-BUTYL ACETATE=1)**
 SPECIFIC GRAVITY: **1.46 20C**
 DENSITY: **1.460**
 WATER SOLUBILITY: **0.1%**
 INCOMPATIBILITIES: strong caustics; when acidic reacts with aluminum; chemically active metals; barium lithium sodium magnesium titanium

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): **50 ppm**
 ODOR DESCRIPTION: Chloroform-like; ethereal Source: CHRIS
 100 % ODOR DETECTION: No data

----- REGULATIONS -----

DOT hazard class: **6.1 POISON**
 DOT guide: **74**
 Identification number: **UN1710**
 shipping name: **Trichloroethylene**

Packing group: III
Label(s) required: KEEP AWAY FROM FOOD
Special provisions: N36,T1
Packaging exceptions: 153
Non bulk packaging: 203
Bulk packaging: 241
Quantity limitations-
Passenger air/rail: 60 L
Cargo aircraft only: 220 L
Vessel stowage: A
Other stowage provisions:40,M2

STCC NUMBER: 4941771

CLEAN WATER ACT Sect.307:Yes

CLEAN WATER ACT Sect.311:No

National Primary Drinking Water Regulations

Maximum Contaminant Levels (MCL): 0.005 mg/mL>(01/09/89)

Maximum Contaminant Level Goals (MCLG) : .0 mg/mL>(01/09/89)

CLEAN AIR ACT: CAA '90 Listed

EPA WASTE NUMBER: U228,D040

CERCLA REF: Not listed

RQ DESIGNATION: B 100 pounds (45.4 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: 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-A

Mailability: Domestic service and air transportation.;shipper's declarator

Max 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

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

SHORT TERM TOXICITY: INHALATION: headache, sleepiness, nausea, vomiting,

dizziness and coughing have been felt around 100 ppm. unconsciousness can result at 3,000 ppm. exposure to 8,000 ppm can cause death. **SKIN:** can be absorbed through skin. **may** cause irritation, burning or redness. **Eyes:** may cause irritation, burning or watering. **INGESTION:** can cause drunkenness, vomiting, diarrhea or abdominal pain. unconsciousness, liver or kidney damage, vision distortion and death have been reported at large doses. (NYDH)

LONG TERM TOXICITY: contact with levels near 100 ppm can cause giddiness, nervous exhaustion, increased sensitivity to alcohol including redness in the face (trichloroethylene blush), the ability to become addicted to the vapor, as well as effects of acute exposure listed above. higher levels can alter one's heart rate. repeated contact with hands can cause excessive dryness, cracking, burning, loss of sense of touch or temporary paralysis of fingers. most of these effects seem to go away after exposure has stopped. trichloroethylene is considered a cancer suspect agent because high levels cause liver cancer in mice. whether it causes cancer in humans is unknown. (NYDH)

TARGET ORGANS: eyes, skin, nose, throat, resp. system, heart, liver, kidneys, CNS.

SYMPTOMS : **INHALATION:** symptoms range from irritation of the nose and throat to nausea, an attitude of irresponsibility, blurred vision, and finally disturbance of central nervous system resulting in cardiac failure. Chronic exposure may cause organic injury. **INGESTION:** symptoms similar to inhalation. **SKIN:** defatting action can cause dermatitis. **EYES:** slightly irritating sensation and lachrymation. Source: **CHRIS**

CONC IDLH: 1000ppm

NIOSH REL: Potential occupational carcinogen **25** ppm Time weighted averages for 8-hour exposure

ACGIH TLV: TLV = 50 ppm
ACGIH STEL: STEL = 200 ppm

OSHA PEL: Final Rule Limits:
TWA = **50 ppm (270 mg/M3)**
STEL = 200 ppm (1080 mg/M3)

MAK INFORMATION: **50 ppm**
270 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.

CINOGEN? : N STATUS: See below
REFERENCES :

ANIMAL SUSPECTED IARC** 20,545,79
ANIMAL POSITIVE IARC** 11,263,76
HUMAN INDEFINITE IARC** 20,545,79

CARCINOGEN LISTS:

IARC: Not classified as to human carcinogenicity or probably not carcinogenic to humans.
MAK: Not listed
NIOSH: Carcinogen defined by NIOSH with no further categorization.
NTP: Not listed
ACGIH: Not listed
OSHA: Not listed

HUMAN TOXICITY DATA: (Source: NIOSH RTECS)
orl-hmn LDLo:7 gm/kg ARTODN 35,295,76

orl-man TDLo:2143 mg/kg 34ZIAG -,602,69
GASTROINTESTINAL
Other changes

ihl-hmn TCLo:6900 mg/m3/10M AHBAAM 116,131,36
BEHAVIORAL
Somnolence (general depressed activity)
BEHAVIORAL
Hallucinations, distorted perceptions

ihl-hmn TCLo:160 ppm/83M AIHAAP 23,167,62
BEHAVIORAL
Hallucinations, distorted perceptions

ihl-hmn TDLo:812 mg/kg BMJOAE 2,689,45
BEHAVIORAL
Somnolence (general depressed activity)
GASTROINTESTINAL
Other changes
LIVER
Jaundice, other or unclassified

ihl-man TCLo:110 ppm/8H BJIMAG 28,293,71
SENSE ORGANS
Eye
Other
BEHAVIORAL
Hallucinations, distorted perceptions

LD50 value: No LD50 in RTECS 1992

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1991)

ihl-rat LCLo:8000 ppm/4H
ipr-rat LD50:1282 mg/kg
orl-mus LD50:2402 mg/kg
ihl-mus LC50:8450 ppm/4H
scu-mus LD50:16 gm/kg
ivn-mus LD50:33900 ug/kg
ipr-dog LD50:1900 mg/kg
scu-dog LDLo:150 mg/kg
ivn-dog LDLo:150 mg/kg
orl-cat LDLo:5864 mg/kg
ihl-cat LCLo:32500 mg/m3/2H
orl-rbt LDLo:7330 mg/kg
ihl-rbt LCLo:11000 ppm
scu-rbt LDLo:1800 mg/kg
ihl-gpg LCLo:37200 ppm/40M

IRRITATION DATA: (Source: NIOSH RTECS 1991)

Reproductive toxicity (1991 RTECS):

This chemical is a mammalian reproductive toxin.

REPRODUCTIVE TOXICITY DATA (1991 RTECS)

orl-rat TDLo:2688 mg/kg (1-22D preg/21D post) TOXID9
4,179,84

EFFECTS ON NEWBORN

Behavioral

orl-rat TDLo:36 gm/kg (15D pre/1-21D preg) TXCYAC
32,229,84

EFFECTS ON NEWBORN

Weaning or lactation index(#alive at weaning per #
alive at day 4)

orl-rat TDLo:1140 mg/kg (14D pre-21D post) BRREAP
488,403,89

SPECIFIC DEVELOPMENTAL ABNORMALITIES

Central nervous system

ihl-rat TCLo:1800 ppm/24H (1-20D preg) APTOD9 19,A22,80

SPECIFIC DEVELOPMENTAL ABNORMALITIES

Musculoskeletal system

SPECIFIC DEVELOPMENTAL ABNORMALITIES

Other developmental abnormalities

ihl-rat TCLo:100 ppm/4H (6-22D preg) JPHYA7 276,24P,78

EFFECTS ON FERTILITY

Post-implantation mortality

EFFECTS ON EMBRYO OR FETUS

Fetotoxicity(except death,e.g.,stunted fetus)

ihl-rat TCLo:1800 ppm/6H (1-20D preg) TXCYAC 14,153,79

SPECIFIC DEVELOPMENTAL ABNORMALITIES

Urogenital system

ihl-rat TCLO:100 ppm/4H (8-21D preg) BJANAD 54,337,82
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

ihl-mus TCLO:100 ppm/7H (5D male) NTIS** PB82-185075
PATERAL EFFECTS
Spermatogenesis

NO SIGNIFICANT
RISK LEVEL(Ca P65) : 60 micrograms/day

----- 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 wet.

REMOVE CLOTHING:

Promptly remove non-impervious clothing that becomes wet.

- ** REFERENCE: NIOSH

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

Greater at any detectable concentration. : **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: ipecac, vomit

FIRST AID SOURCE: CHRIS Manual 1991

DO NOT administer adrenalin or epinephrine; get medical attention for all cases of overexposure.

INHALATION: remove victim to fresh air; if necessary, apply artificial respiration and/or administer oxygen.

INGESTION: have victim drink water and induce vomiting; repeat three times; then give 1 tablespoon epsom salts in water.

EYES: flush thoroughly with water.

SKIN: wash 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: Water fog. CHRIS91

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

DOT SHIPPING NAME: Trichloroethylene

DOT ID NUMBER: UN1710

ERG90

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 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 **CHEMTREC AT 1-800-424-9300** FOR EMERGENCY ASSISTANCE.

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.

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ms.

----- IDENTIFIERS -----

CHEMTOX RECORD 5249 LAST UPDATE OF THIS RECORD: 06/03/92
 NAME: ETHYLENE, TETRACHLORO-
 SYNONYMS: ANKILOSTIN; ANTI SOL 1; CARBON BICHLORIDE; CARBON
 DICHLORIDE; CZTEROCHLOROETYLEN (Polish); DIDAKENE;
 DOW-PER; ENT 1,860; ETHENE, **TETRACHLORO-**; ETHYLENE
 TETRACHLORIDE; FEDAL-UN; NCI-C04580; NEMA; PER; PERAWIN;
 PERC; PERCHLOORETHYLEEN, PER (Dutch); PERCHLOR;
 PERCHLORAETHYLEN, PER (German); PERCHLORETHYLENE;
 PERCHLORETHYLENE, PER (French); PERCHLOROETHYLENE;
 PERCLEN; PERCLOROETILENE (Italian); PERCOSOLVE; PERK;
 PERKLONE; PERSEC; TETLEN; TETRACAP; TETRACHLOORETHEEN
 (Dutch); TETRACHLORAETHEN (German); TETRACHLORETHYLENE;
 TETRACHLOROETHENE; TETRACHLOROETHYLENE;
 1,1,2,2, -TETRACHLOROETHYLENE; TETRACHLOROETHYLENE (DOT);
 TETRAOROETENE (Italian); TETRALENO; TETRALEX; TETRAVEC;
 TETROGUER; TETROPIL

CAS: 127-18-4 RTECS: KX3850000
FORMULA: C2Cl4 MOL WT: 165.82
WLN: GYGWGG
CHEMICAL CLASS: FT

See other identifiers listed below under Regulations.

----- PROPERTIES -----

PHYSICAL DESCRIPTION: colorless liquid, chloroform-like odor.
 BOILING POINT: 394.2 K 121 C 249.8 F
 MELTING POINT: 249.65 K -23.5 C -10.3 F
 FLASH POINT: NA
AUTO IGNITION: NA
 VAPOR PRESSURE: 15.8MM @ 22C
 UEL: NA
 LEL: NA
 IONIZATION POTENTIAL (eV): 9.32
 VAPOR DENSITY: No data
 EVAPORATION RATE: 2.59 (n-BUTYL ACETATE=1)
 SPECIFIC GRAVITY: 1.625 @20/4C
 DENSITY: 1.6311 @ 15/4C
 WATER SOLUBILITY: QUITE SOLUBLE IN H2O (0.015G/ML @20C),
 IT IS MISCIBLE WITH MOST ORGANIC
 SOLVENTS **AND** OILS.

INCOMPATIBILITIES: strong oxidizers chemically active
 metals such as barium lithium
 beryllium sodium

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

POLYMERIZATION POSSIBILITIES: No data
TOXIC FIRE GASES: HCL AND PHOSGENE\CORROSIVE
R DETECTED AT (ppm): 5 ppm
R DESCRIPTION: mildly sweet Source:CHRIS
100 % ODOR DETECTION: No data

----- REGULATIONS -----

DOT hazard class: 6.1 POISON
DOT guide: 74
Identification number: UN1897
DOT shipping name: Tetrachloroethylene
Packing group: III
Label(s) required: KEEP AWAY FROM FOOD
Special provisions: N36
Packaging exceptions: 153
Non bulk packaging: 203
Bulk packaging: 241
Quantity limitations-
Passenger air/rail: 60 L
Cargo aircraft only: 220 L
Vessel stowage: A
Other stowage provisions:40,M2

STCC NUMBER: 4940355

CLEAN WATER ACT Sect.307:Yes

CLEAN WATER ACT Sect.311:No

Additional Primary Drinking Water Regulations

Maximum Contaminant Levels (MCL) : 0.005 mg/mL» (07/30/92)

Maximum Contaminant Level Goals (MCLG): 0 mg/mL» (07/30/92)

CLEAN AIR ACT: CAA '90 Listed

EPA WASTE NUMBER: U210,D039

CERCLA REF: Y

RQ 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.
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

Max 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) : (0) This material does not readily burn.
REACTIVITY (YELLOW): (0) Stable even under fire conditions.
SPECIAL : Unspecified

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

SHORT **TERM** TOXICITY: INHALATION: exposures of 200 ppm for 1 hour can cause irritation of the nose, mouth and throat, dizziness, headaches and lightheadedness; exposures of 1,000 **ppm** for 30 minutes can cause difficult breathing, weakness, **loss** of muscle control, irritability, tremors, convulsions, paralysis, coma, heart irregularities and death. **SKIN**: can cause dry, scaly skin, a mild to moderate burning sensation, redness and inflammation. Eyes: can cause burning and irritation. **INGESTION**: can cause nausea, vomiting, diarrhea, bloody stool, a reddening of face and neck, weakness and loss of muscle control. (NYDH)

LONG TERM TOXICITY: exposures over 200 ppm during weeks or months can cause irritation of the respiratory tract, nausea, headache, sleeplessness, abdominal pains, constipation, dizziness, increased perspiration, fatigue, skin infection, kidney and liver damage, fluid in the lungs and coma. most of these effects will disappear after exposure is stopped. tetrachloroethylene at high levels has caused cancer and birth defects in mice. whether it causes cancer in humans is unknown. (NYDH)

TARGET ORGANS: skin, mucous membrane, eyes, CNS, gastrointestinal tract. liver, kidneys.

SYMPTOMS: Vapor can affect central nervous system and cause anesthesia. Liquid may irritate skin after prolonged contact. **May** irritate eyes but causes no injury. Source: CHRIS

CONC IDLH: 500ppm

NIOSH REL: Potential occupational carcinogen --MINIMIZE EXPOSURE (Limit of **quantitation 0.4 ppm**)

ACGIH TLV: **TLV = 50 ppm**
ACGIH STEL: **STEL = 200 ppm**

OSHA PEL: Transitional Limits:
PEL = 100 PPM; CEILING = 200 PPM; MAXIMUM **PEAK ABOVE CEILING**
Final Rule Limits:
TWA = **25 ppm** (170 mg/M3)

MAK INFORMATION:

50 ppm

345 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.

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

CARCINOGEN LISTS:

IARC: Carcinogen defined by IARC to be possibly carcinogenic to humans, but having (usually) no 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: Not listed

OSHA: Not listed

HUMAN TOXICITY DATA: (Source: NIOSH RTECS)

ihl-hmn TCLo:96 ppm/7H **NTIS**** PB257-185

PERIPHERAL NERVE **AND** SENSATION

Local anesthetic

SENSE ORGANS

Eye

Conjunctive irritation

BEHAVIORAL

Hallucinations, distorted perceptions

orl-chd TDLo:545 mg/kg JTCTDW 23,103,85

BEHAVIORAL

coma

LD50 value:

orl-rat **LD50:2629** mg/ kg

OTHER SPECIES TOXICITY DATA: (Source: NIOSH RTECS 1991)

orl-rat LD50:2629 mg/kg

ihl-rat LC50:34200 mg/m3/8H

ipr-rat LD50:4678 mg/kg

orl-mus LD50:8100 mg/kg

ihl-mus **LC50:5200** ppm/4H

scu-mus LD50:65 gm/kg
orl-dog LDLo:4 gm/kg
ipr-dog LD50:2100 mg/kg
ivn-dog LDLo:85 mg/kg
orl-cat LDLo:4 gm/kg
orl-rbt LDLo:5 gm/kg
scu-rbt LDLo:2200 mg/kg

IRRITATION DATA: (Source: NIOSH RTECS 1991)

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

Reproductive toxicity (1991 RTECS):

This chemical is a mammalian reproductive toxin.

REPRODUCTIVE TOXICITY DATA (1991 RTECS)

ihl-rat TCLo:1000 ppm/24H (14D pre/1-22D preg) APTOD9
19,A21,80

SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system

ihl-rat TCLo:1000 ppm/24H (1-22D preg) APTOD9 19,A21,80
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)

ihl-rat TCLo:900 ppm/7H (7-13D preg) TJADAB 19,41A,79
EFFECTS ON NEWBORN
Live birth index(# fetuses per liter)
EFFECTS ON NEWBORN

EFFECTS ON NEWBORN
Behavioral

ihl-rat TCLo:300 ppm/7H (6-15D preg) TXAPA9 32,84,75
EFFECTS ON FERTILITY
Post-implantation mortality

ihl-mus TCLo:300 ppm/7H (6-15D preg) TXAPA9 32,84,75
EFFECTS ON EMBRYO OR FETUS
Fetotoxicity(except death,e.g.,stunted fetus)
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Musculoskeletal system
SPECIFIC DEVELOPMENTAL ABNORMALITIES
Homeostatis

NO SIGNIFICANT

RISK LEVEL(Ca P65): 14 micrograms/day

----- 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 contaminated.

** 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
INHALATION: if illness occurs, remove patient to fresh air, keep him warm and quiet, and get medical attention.
INGESTION: induce vomiting only on physician's recommendation.
EYES AND
SKIN: flush with plenty of water and get medical attention if irritation injury occurs.

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 -----

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

DOT SHIPPING NAME: Tetrachloroethylene
DOT ID NUMBER: UN1897

ERG90

* POTENTIAL HAZARDS *

GUIDE 74

*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.

~~IR&~~ 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 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 CHEMTREC AT 1-800-424-9300 FOR EMERGENCY ASSISTANCE.

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.

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APPENDIX C

ENSAFE CORPORATE *HEALTH AND SAFETY* MANUAL

DRILLING SAFETY GUIDE

Drilling Safety Guide

EnSafe is concerned about employee safety while working on or around drill rigs as well as when traveling to and from a drilling site, moving the drill rig and tools from location to location on a site and during maintenance of the drill rig. Every drill crew will have a designated safety supervisor. The safety supervisor **will** have the responsibility for ensuring that all drilling operations are conducted in a safe manner. **All** personnel working on, with, or around a drill rig will be under the jurisdiction of the rig safety supervisor.

Drill Rig Safety Supervisor

The safety supervisor for the **drill** crew will be the drill rig operator. However, the EnSafe safety officer still maintains the overall safety responsibility for the site. The drill crew safety supervisor is a direct representative of the site health and safety supervisor and will report any safety problems directly to the site health and safety officer. The drill rig safety supervisor **will:**

- e be the leader in using proper personal protective equipment. He/she will set an example for other personnel to follow.
- e enforce the requirements of the health and safety plan and take appropriate actions when other personnel are not following the requirements of the health and safety plan.
- e ensure that all drill rig and associated drill rig equipment is properly maintained.
- e ensure that all **drill** rig operating personnel are thoroughly familiar with the drill operations.
- e inspect the drill rig and associated drill rig equipment for damage before starting drilling operations. Check for structural damage, loose bolts or nuts, correct tension in chains and cables, loose or missing guards or protective covers, fluid leaks, damaged hoses and or damaged pressure gauges and pressure relief valves.
- e test **all** emergency and warning devices such as emergency shut-down switches at least daily (prior to starting drilling operations). Drilling will not be permitted until all emergency and warning devices are functioning.
- e conduct a safety briefing daily before starting drilling operations. Any new employee **will** receive a copy of the drilling operations safety manual, and the drill rig manufacturer's operating and maintenance manual.
- e ensure that each employee reads and understands the drill rig manufacturer's operating and maintenance manual.
- e observe the mental, emotional, and physical capabilities of each worker.
- ensure that each drill rig has a first aid kit **and** fire extinguisher.
- **maintain** a list of emergency contact telephone numbers. **This** list **will** be posted in a prominent location and each drill rig employee will be **informed** of the lists location.

Drill Rig Personnel Protective Equipment

For most geotechnical, mineral, and/or groundwater drilling, drill rig personal protective equipment will include the following:

- e hard hat
- safety shoes with steel toe and steel shank (or equivalent)
- e gloves
- e safety glasses with side shields
- e close fitting but comfortable clothes
- e hearing protection

It is important that clothing does not have loose ends, straps, draw strings or belts, or other unfastened parts that might become caught in or on a rotating or translating part of the drill rig.

Rings, necklaces, or other jewelry will not be worn during drilling operations.

Additional protective equipment may be required by the site specific health and safety plan.

Drill Rig Housekeeping

The following housekeeping measures must be taken for all drilling operations.

- e Suitable storage locations will **be** provided for **all** tools, materials and supplies. The storage should be conveniently located and will provide for safe handling of all supplies.
- e **Drill** tools, supplies, and materials will not be transported on the drill rig unless the drill rig is designed and equipped to *carry* drill tools, supplies, and materials.
- e **Pipe**, drill rods, casing, augers, and **similar** drilling tools when stored will be stacked in a manner that will prevent spreading, rolling, or sliding.
- Penetration or other driving hammers will **be secured** to prevent movement when not in **use**.
- e Work **areas**, **platforms**, walkways, scaffolding, and other access ways will be kept free of materials, debris and obstructions and substances such as ice, grease, or oil that could **cause** a surface to become slick or otherwise **hazardous**.
- Never store gasoline in a non-approved container. Red, non-sparking, vented containers marked with the word gasoline will be used. The **fill** spout **will** have a flame arrester.
- Prior to drilling, adequate site clearing and leveling **will** be **performed** to accommodate the drill rig **and** supplies and to provide a safe **working area**. **Drilling** will not be **started** **when** **tree** limbs, unstable ground or site obstructions cause unsafe tool handling conditions.

Maintenance Safety

Well maintained drilling equipment makes drilling operations safer. When performing equipment/tool maintenance, the follow safety precautions will be followed:

- e **Wear** safety glasses when maintenance is performed on **drill rigs** or drilling tools.
- e Shut down the drill rig engine to make repairs or adjustments to the rig or to lubricate **fittings** (except to make repairs or adjustments that can **only** be made while the engine is running).
- e Always block the wheels or lower the leveling jacks or both. Set the hand brake before working under a drill rig.
- e Release all pressure on hydraulic systems, the drilling fluid system, and the air operating system of the drill rig prior to performing maintenance.
- a Use extreme caution when opening drain plugs and radiator caps and other pressurized plugs and caps.
- e Allow time for the engine and exhaust to cool before performing maintenance on these systems.
- e Never weld or cut on or near the fuel **tank**.
- e Do not use gasoline or other volatile or flammable liquids as a cleaning agent.
- **Follow** the manufacturer's recommendations for quantity and type of lubricants, hydraulic fluids and coolants.
- a Replace all caps, filler plugs, protective guards or panels, and high pressure hose clamps and chains or cables that have been removed during maintenance.
- Perform a safety inspection prior to starting drilling equipment after maintenance is **performed**.

Safe Use of Hand Tools

There **are** a large number of **hand** tools that *can* be used on or around a drill rig. The most important rule of hand tools is to use a tool for its intended purpose. The following are a few **safety** rules to follow when using hand tools.

- When using a hammer, wear safety glasses and require **all** others around you to wear **safety** glasses.
- e When using **a** chisel, wear safety glasses and require **all** others around you to wear safety glasses.
- e **Keep** all tools cleaned and **stored in** an orderly manner.
- e **Use wrenches** on nuts, not pliers.
- e **Use** screwdrivers with blades that fit the **screw** slot.
- e When using **a** wrench **on** a tight nut, use some penetrating **oil** and use the largest wrench available that fits the nut. When possible pull **on** the wrench handle rather than pushing, and apply force to the wrench with **both** hands when possible and with both feet **firmly** placed. Don't push or pull with one or both feet on the **drill rig** or the side of a mud pit or some other blocking-off device. Always assume that you may lose your **footing**. **Check the** place where you may fall for sharp objects.

- Keep all pipe wrenches clean and in good repair. The jaws of pipe wrenches will be wire brushed frequently to prevent accumulation of dirt and grease which cause wrenches to slip.
- Never use pipe wrenches in place of a rod holding device.
- Replace hock and heel jaws when visibly **worn**.
- When **breaking** tool joints on the ground or on a drilling platform, position hands so that fingers will not be smashed between the wrench handle and the ground or the platform if the wrench were to slip or the joint suddenly to let go.

Safety During Drilling Operations

- Do not drive a drill rig from hole to hole with the mast (derrick) **in** the **raised** position.
- Before raising the mast, **look** up to check for overhead obstructions.
- Before raising the mast, all drill rig personnel (except the person raising the mast) and visitors will be cleared from the area immediately to the rear and sides of the mast. All drill rig personnel and visitors will be informed that the mast is being raised prior to raising the mast.
- **All** drill rig personnel and visitors will be instructed to stand clear of the drill rig immediately prior to and during starting of the engine.
- **All** gear boxes will be in the neutral position, all hoist levers will be disengaged, all hydraulic levers will be in the non-actuating positions, and the cathead rope will not be on the cathead before starting the drill rig engine.
- The drill rig must be leveled and **stabilized** with leveling jacks and/or solid cribbing before the mast is raised. The drill rig will be leveled if settling occurs after initial set up.
- The mast will be lowered **only** when the leveling jacks **are** down. The leveling jacks must be in the down position until the mast is completely lowered.
- Secure and/or lock the mast according to the drill rig manufacturer's recommendations before starting drilling operations.
- The drill rig must only be operated from the control position. If the operator must leave the control position, the **rotary** drive and the feed control must be placed in the neutral position. The drill engine will be shut down when the operator leaves the vicinity of the drill rig.
- Throwing or dropping of tools is not permitted. **All** tools will be carefully passed by hand between personnel or a hoist line will be **used**.
- When **drilling** within an enclosed **area**, ensure that fumes **are** exhausted out of the **area**. **Exhaust fumes can be toxic and may not be detected by smell.**
- **Clean mud** and **grease** from boots before mounting the drill platform. Use hand holds and railings. Watch for slippery ground when dismounting from the drill platform.
- Do not touch any metal parts of the drill rig with exposed flesh during freezing weather. Freezing of moist **skin** to **metal** can occur almost **instantaneously**.
- **All** unattended boreholes must be covered or otherwise protected to prevent drill rig personnel, site visitors, or **animals** from **stepping** or falling into the hole.
- Do not attempt to use one or both hands to carry tools when climbing ladders.

Working on Derrick Platforms

- When working on a derrick platform, **us** a safety belt and a lifeline. The safety belt will be at least **4** inches wide and will fit snugly but comfortably. The lifeline, will be less than 6 feet long and attached to the derrick.
- The safety belt and lifeline will be strong enough to withstand the dynamic force of a 250 pound weight falling 6 feet.
- **A** safety climbing device will be used when climbing to a derrick platform that is higher than 20 feet.
- The lifeline will be fastened to the derrick just above the derrick platform to a structural member that is not attached to the platform or to other lines or cables supporting the platform.
- **Tools** will be securely attached to the platform with safety lines. Do not attach a tool to a line attached to the wrist or other body part.
- When working on a derrick platform, do not guide drill rods or pipe into racks or other supports by taking hold of a moving hoist line or a traveling block.
- Derrick platforms over **4** feet above the ground will have toe boards and safety railings.

Working on the Ground

- Workers on the ground must avoid going under elevated platforms.
- Terminate drilling operations and if possible lower the mast during an electrical storm.
- Overhead and buried utilities must **be** located and marked on **all** boring location plans and boring assignment sheets.
- When there *are* overhead electrical power lines at or near a drilling site or project, consider **all wire** to be charged and dangerous.
- Watch for sagging power lines before entering a site. Do not **lift** power lines to gain entry. **Call** the utility to have them **lift** the power lines or to deenergize the power.
- Operations adjacent to overhead lines **are** prohibited unless one of the following conditions is satisfied:
 - Power has **been** shut off and positive means taken to prevent the lines from being energized.
 - Equipment, or any part, **does** not have the capability of coming within the following **minimum** clearance from energized overhead lines, or the equipment **has** been positioned and blocked to assure **no** part, including cables *can* come within the following minimum clearances:

Power lines nominal system kv	Minimum required clearance
0 – 50	10 feet
51 – 100	12 feet
101 – 200	15 feet
201 – 300	20 feet
301 – 500	25 feet
501 – 750	35 feet

- e While in transit with boom lowered and no load, the equipment clearance will be a minimum of 4 feet for voltages less than 50kv, 10 feet for voltages 51kv to 345kv, and 16 feet for voltages over 345kv.
- Before working near transmitter towers where an electrical charge **can** be induced in the equipment or materials **being** handled, the transmitter will be de-energized. The following precautions **will** be taken to dissipate induced voltages:
 - The equipment will be provided with **an** electrical ground to the upper rotating structure supporting the boom.
 - Ground jumper cables will be attached to materials **being** handled by boom equipment when electrical charge may be induced while working near energized transmitters. Crews will **be** provided nonconductive poles having large alligator clips or other similar protection to attach the ground cable to the load. Insulating gloves will be used.
- e Continue to watch overhead power lines. Both hoist lines and overhead power lines **can** be moved toward each other by the wind.
- If there **are any** questions concerning drill **rig** operations on a site in the vicinity of overhead power **lines**, **call** the power company. The power company will provide **expert** advice **as a** public service.
- **Look** for **warning** signs indicating underground utilities. Underground utilities may be **located** a considerable distance away **from** the **warning** sign. **Call** the utility and jointly **determine the** precise location **of all** underground utility lines, mark and flag the locations and determine the **specific** precautions to be taken to ensure **safe** drilling operations.

Wire Rope Safety

- All wire ropes and fittings **will** be visually inspected at least once a week for abrasion, broken wires, wear, reduction in rope diameter, reduction in wire diameter, fatigue, corrosion, damage from heat, improper reeving, jamming, crushing, bird caging, kinking, core protrusion, and damage to lifting hardware.
- Wire ropes must be replaced when inspection indicates excessive damage. **The Wire Rope User's Manual** may be used **as** a guide for determining excessive damage.
- Wire ropes that have not been used for a period of a month or more will be thoroughly inspected before being returned to service.
- **All** manufactured and end fittings and connections must be installed according to the manufacturer's specifications.
- Swivel bearings on ball-bearing type hoisting swivels must be inspected and lubricated daily to ensure that the swivel rotates freely under load.
- Do not drill through or rotate drill through a slipping device, do not hoist more than 10 feet of the drill rod column above the top of the last (mast), do not hoist a rod column with loose tool joints, and do not make up, tighten, or loosen tool hoists while the rod column is being supported by a **rod slipping** device.
- a Do not attempt to brake the fall of a drill rod column with your hands or by increasing tension on the rod slipping device.
- **Wire** ropes must **be** properly matched with each sheave. The sheave will pinch wire rope that is too large. Wire rope that is too small will groove the sheave. Once a sheave is **grooved**, it **will** severely pinch and damage larger **sized** wire rope.
- Use tool handling hoists only for vertical **lifting** of tools. Do not use tool handling hoists to pull on objects away from the drill **rig**.
- **All** hoisting hooks **will** be equipped with safety latches.
- When tools or **similar** loads cannot be **raised** with a hoist, disconnect the hoist line and connect the tools directly to the feed mechanism of the drill. Do not use hydraulic leveling jacks for added pull for the hoist line or the feed mechanism of the drill.
- **Minimize** shock loading of a wire rope; apply loads smoothly and steadily.
- Avoid sudden loading in cold weather.
- Never use frozen **ropes**.
- Protect **wire rope from** sharp corners or edges.
- Replace faulty guides **and** rollers.
- Replace worn sheaves or **worn** sheave **bearings**.
- **Know** the safe **working** load of the equipment and tackle. Never exceed safe working limits.
- **Periodically inspect** clutches **and** brakes of hoists.
- Always **wear** gloves when handling wire **ropes**.
- Do not guide **wire rope** onto hoist drums with your hands.
- After installation of a new **wire rope**, the first lift must **be** a light load to allow the **wire rope** to adjust.
- a Never leave a load suspended when the hoist is unattended.
- Never **use** a hoist **line** to ride up **the** mast.

Cathead and Rope Hoist Safety

- Keep the cathead clean and free of rust and oil and/or grease. The cathead must be cleaned with a wire brush when it becomes rusty.
- Check the cathead for rope wear grooves. If a rope groove forms that is deeper than $\frac{1}{8}$ inch, the cathead must be replaced.
- Always **start** work with a clean, dry, sound rope. A wet or oily rope may grab the cathead and cause drill tools or other items to be rapidly hoisted to the top of the mast. If the **rope** grabs the cathead or otherwise becomes **tangled in the drum**, release the rope and sound the alarm for **all** personnel to clear the **area** rapidly.
- The rope must not be permitted to contact chemicals.
- Never wrap the **rope** from a cathead around a hand, wrist, arm, foot, ankle, leg, or any other body part.
- Attach the hammer to the **rope** using a knot that will not slip such as a bowline.
- A minimum of 18 inches must be maintained between the operating hand and the cathead drum when driving samplers, casing, or other tools. Be aware that the rope advances toward the cathead with each hammer blow as the sampler or other drilling tool advances into the ground. Loosen grip on the **rope** as the hammer falls. Maintaining a tight grip on the rope increases the chances of being pulled into the cathead.
- Do not use a rope that is longer than necessary. **A** rope that is too long can form a ground loop or otherwise become entangled with the operator's legs.
- Do not leave a cathead unattended with the rope wrapped on the drum.
- Position **all** other hoist lines to prevent contact with the operating cathead rope.
- The cathead operator must be on a level surface with good, firm footing conditions.

Auger Safety

- The drill rig must be level, the clutch or hydraulic rotation control disengaged, the transmission in low gear and the engine running at low RPM when starting an auger **boring**.
- Seat the auger head below the ground surface with an adequate amount of downward pressure prior to rotation.
- Observe the auger head while slowly engaging the clutch or rotation control and **start** rotation. Stay clear of the auger.
- Slowly rotate the auger and auger head while continuing to apply downward pressure. **Keep** one hand on the clutch or the rotation control at **all** times until the auger has **penetrated** about one foot or **more** below the surface.
- **Follow** manufacturer's recommended methods for securing the auger to the power coupling.
- Never place **hands** or fingers under the **bottom** of an auger section when hoisting the auger over the **top** of the auger section in the **ground** or other hard surfaces such as the drill rig **platform**.
- Never place feet under the auger section that is being hoisted.
- Stay clear of rotating augers **and** other rotating components of the drill rig.

- e Never reach behind or around a rotating auger.
- e Use a long-handle shovel to move auger cuttings away from the auger.
- e Augers will be cleaned **only** when the drill rig is in neutral and the augers have stopped rotating.

Rotary and Core Drilling Safety

- **Water swivels and hoist** plugs must be lubricated and checked for frozen bearings **before** use.
- e **Drill rod** chuck jaws must **be** checked periodically **and** replaced as necessary.
- e The weight of the drill rod string and other expected hoist loads must not exceed the hoist and sheaves capacities.
- e Only the operator of the drill rig will brake or set **a** manual chuck to ensure that rotation of the chuck will not occur prior to removing the wrench from the chuck.
- e The drill rod chuck jaws will not be used **to** brake drill rods during lowering into the hole.
- e Drill rods will not be held or lowered into the hole with pipe wrenches.
- e Do not attempt to grab falling drill rods with hands or wrenches.
- e In the event of a plugged bit or other circulation blockage, the high pressure in the piping **and** hose between the pump and the obstruction must be relieved or bled down prior to **breaking** the first tool joint.
- e Use **a** rubber or other suitable rod wiper to clean rods during removal from the hole.
- Do** not use hands to clean drilling fluids from the drill rods.
- e Do not lean unsecured drill **rods** against the mast.

APPENDIX D

DIRECTIONS TO EMERGENCY MEDICAL FACILITIES

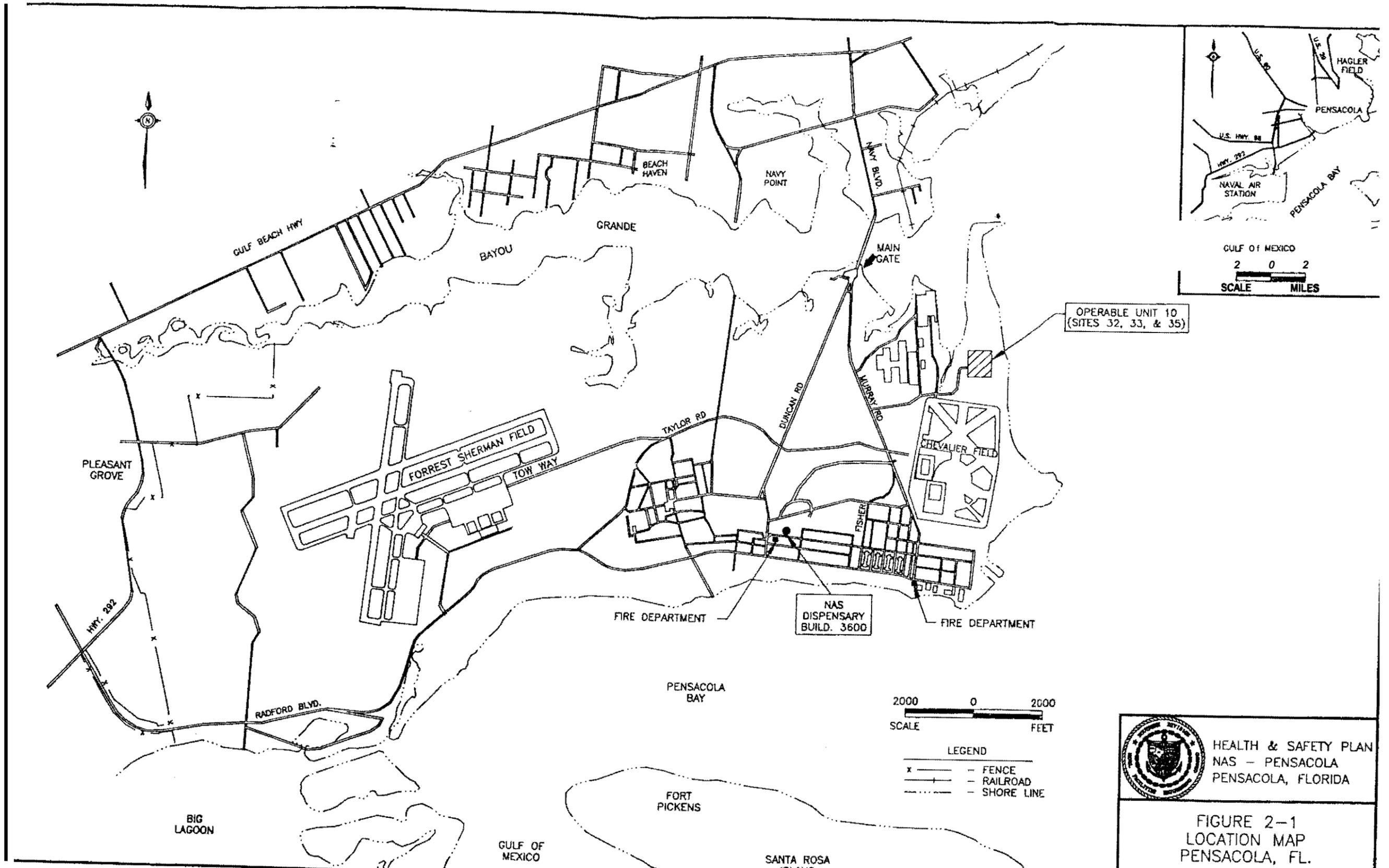
DIRECTIONS TO THE NEAREST MEDICAL FACILITIES

The nearest hospital and the nearest facility capable of treating chemical burns are the same facility, which is located in the NAS Pensacola Dispensary Building. Therefore, there is only one set of directions.

**Nearest Hospital
NAS Pensacola Dispensary Building
3600 Turner Street
NAS Pensacola, Florida
Emergency Number: (904) 452-3333**

From the Industrial Waste Water Treatment Facility:

- 1. Go west on Industrial Road for one-half mile.**
- 2. Turn right onto Taylor Road and proceed for approximately 200 yards.**
- 3. Turn left onto Fisher Avenue.**
- 4. Continue onto Fisher Avenue for two blocks.**
- 5. Turn right onto Turner Street. The Dispensary will be on the right.**



OPERABLE UNIT 10
(SITES 32, 33, & 35)

NAS
DISPENSARY
BUILD. 3600



HEALTH & SAFETY PLAN
NAS - PENSACOLA
PENSACOLA, FLORIDA

FIGURE 2-1
LOCATION MAP
PENSACOLA, FL.

APPENDIX E
HEALTH AND SAFETY PLAN FORMS

PLAN ACCEPTANCE FORM

PROJECT HEALTH AND SAFETY PLAN

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

Job No: 2151-048

Contract No: N62467-89-D-0318

Project: **OPERABLE UNIT 10** (Sites 32, 33 and 35)

I represent that 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

EMPLOYEE EXPOSURE HISTORY FORM

EMPLOYEE: _____

JOB NAME: _____

DATE(S) FROM/TO: _____

HOURS ONSITE: _____

CONTAMINANTS (SUSPECTED/REPORTED):

(SEE ATTACHED LABORATORY ANALYSIS)

PLAN FEEDBACK FORM

Problems with plan requirements:

Unexpected situations encountered:

Recommendations for revisions:
